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USSR Report

CHEMISTRY

No. 84

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ALKALOIDS

UDC 547.944/945

ALKALOIDS OF CAPPARIS SPINOSA L.

Dushanbe DOKLADY AKADEMII NAUK TADZHIKSKOY SSR in Russian Vol 24, No 10, Oct 81 (manuscript received 22 Jul 81) pp 617-620

SADYKOV, Yu. D. and KHODZHIMATOV, M., Chemistry Institute imeni V. I. Nikitin, Tajik SSR Academy of Sciences

[Abstract] Capparis spinosa L., long used in folk medicine, was studied to learn the dynamics of alkaloid accumulation in roots through the year. The greatest accumulation came during most rapid growth, up through flowering, in July and August. Stachydrine accounted for 85.19 to 87.43% of alkaloids found in the plant roots; the authors synthesized several previously unknown salts from it. References 7: 6 Russian, 1 English. [85-12131]

ANALYTICAL CHEMISTRY

UDC 541(63 + 49)

CONFORMATIONAL ANALYSIS OF TETRAPHENYL-1,2-CYCLOHEXYLENEDIPHOSPHINE DIOXIDE AS POTENTIAL LIGAND

Kiev TEORETICHESKAYA I EKSPERIMENTAL'NAYA KHIMIYA in Russian Vol 17, No 6, Nov-Dec 81 (manuscript received 23 Dec 80) pp 833-838

BARANOV, A. P., DASHEVSKIY, V. G., MEDVED', T. Ya., PETOV, G. M., MATROSOV, Ye. I. and KABACHNIK, M. I., Institute of Hetero-Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] An attempt was made to explain the conformational rigidity of the ligand and the effect of the cyclohexylene bridge at the positions of phosphoryl groups by calculating atom-atom potential functions of selected parameters. Two geometrically cis- and trans-isomers, with the cis-isomer corresponding to the axial-equatorial position on the ring, and the trans-isomer in either axial-axial or equatorial-equatorial positions, were examined. Changes in distances between donor centers of energetically optimal forms of the ligand show the possibility of effective chelating of metal cations with radii of 0.04 to 0.08 nm, such as Li^+. Figures 3; references 11 (Russian).
[105-12131]

UDC 543.42 + 541.49 + 53.083.2

STUDY OF PHOSPHORUS-CONTAINING MACROCYCLES BY DESORPTION FIELD MASS-SPECTROMETRY

Kiev TEORETICHESKAYA I EKSPERIMENTAL'NAYA KHIMIYA in Russian Vol 17, No 6, Nov-Dec 81 (manuscript received 17 Feb 81) pp 849-851

GOLOVATYY, V. G. and KOROL', E. N., Institute of Physical Chemistry imeni L. V. Pisarzhevskiy, UkSSR Academy of Sciences, Kiev

[Abstract] Desorption field mass-spectrometry, with a tungsten thread covered with a dendrite-shaped gold coating ion emitter, was used to study

8 macrocyclic ionophores (crown ethers, cryptands and their analogs). Ion emission was effected by heating the emitter up to a certain point, after which the flow decreased. For 2 compounds, low emitter temperatures, of 40 and 60° C respectively, brought intensive peaks of M+ monomer ions, with low intensity of 2M+ dimer ions. Results indicated that the molecular mass of newly synthesized macrocyclic polyethers, which can exist as both monomers and dimers, can be determined using desorption field mass spectrometry. Figure; references 7: 6 Russian, 1 English.
[105-12131]

BIOCHEMISTRY

UDC 66.096.5.099.2

KINETICS OF GRANULATION OF MICROBIOLOGICALLY SYNTHESIZED PRODUCTS IN FLUIDIZED BEDS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 82 pp 38-42

BUYEVICH, Yu. A, MINAYEV, G. A., PLOKHOTNICHENKO, M. V. and SUKHOV, A. S.

[Abstract] The granulation of microbiologically synthesized materials, such as fodder yeasts, yeast residues, proteins, etc., by the title process, is a significant improvement over current methods for the following reasons: 1, the new process requires fewer individual operations; 2, several operations (e.g. dehydration, granulation, etc.) may be performed in the same vessel; 3, the obtained product is drier, purer and of better quality. Equations and graphs are presented to describe the interrelationships among the parameters of the dissolved product + granular product + + fluidized bed system. Parameters include densities and viscosities; concentrations, number, shape and size of the particles, rates of addition and removal of components, etc. The obtained statistical madel may be used to estimate the engineering parameters necessary for process development. Although constructed primarily for the granulation kinetics, this model may be used to estimate hydrodynamic and thermal behavior as well. Figures 5; references 17: 15 Russian, 2 Western.
[129-12027]

UDC 615.355.012 : 615.014.455

ULTRAFILTRATION OF CULTURE LIQUIDS CONTAINING RHODEXMAN

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 15, No 11, Nov 81 (manuscript received 12 Jan 81) pp 86-88

TYURIN, V. I., BIL'DYUKEVICH, A. V., GRINSHPAN, D. D. and DAPUTSKIY, F. N., Scientific Research Institute for Physical Chemical Problems, Belorussian University imeni V. I. Lenin, Minsk

[Abstract] Rhodotorula yeast was cultivated in liquid culture (Dytnerskiy, 1978) to obtain Rhodexman. The culture liquid was processed by a

super-centrifuge at 15,000-20,000 rpm, to remove cells, then concentrated by ultrafiltration through semipermeable cellulose membranes. In 10 tests, Rhodexman content in native solutions ranged between 1.9 and 2.2 g/l. Polysaccharide content by weight was determined by precipitation in a triple volume of ethyl alcohol. Glucose and organic acid contants were also determined, and ultra-violet chromatograms made. Membrane pore size, working pressure, conentration time and pH of the native solution were studied to determine optimum conditions for the process. It was determined that ultrafiltration made it possible to eliminate pH correction, vacuum distillation and alcohol precipitation procedures used to obtain Rhodexman. Figures 3; references 3 (Russian).
[92-12131]

UDC 663.15.033.001.33 663.14.636.087.24

CLASSIFYING FERMENTERS FOR PRODUCING FEED PROTEIN

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 81 pp 43-45

KUZNETSOV, A. M., engineer

[Abstract] Recognizing the lack of an orderly classification system for various types of fermenters, the author developed nomenclature according to basic design features such as the modes of power delivery and mixing. Categories include fermenters with gas phase power delivery, liquid phase types which are divided into subgroups with automatic suction devices for mixing, ejection fermenters and current fermenters, and types with combined liquid and gas phase power delivery in various combinations. Fermenters were also classified according to application into those intended for growing pure cultures and those used in industrial feed protein production. Selection of a particular design requires consideration of use, economy of operation and difficulty of producing the design. Figure; references 6: 4 Russian, 2 Western.
[96-12131]

UDC 615.33.021.6:510.67

CONSTRUCTION OF LOGIC MODELS OF MICROBIOLOGICAL PROCESSES AND THEIR USE IN PROGNOSTICATION

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 1, Jan 82
(manuscript received 16 Mar 81) pp 101-105

BIRYUKOV, V. V., PAVLOV, V. S. and KATS, M. D., All-Union Scientific Research Institute of Antibiotics, Moscow; Rubezhnoye Branch of the Scientific Research Institute of Organic Intermediate Products and Dyes

[Abstract] Regression analysis was used routinely in various studies of microbiological processes and in attempts to optimize them. A number of special studies showed that this method was inadequate in certain situations. Shcheglov developed a satisfactory model based on normal operational data using a logic model in which the information about a process was represented as a logical conjunction--a combination of various levels of input factors. In the present paper the chance to prognosticate the yield of penicillin in a biosynthetic method was tested using this logic model. In 19 out of 20 test cases this model predicted correctly the outcome. Another advantage of this model is that its algorithm can be modified as new experimental data are developed. References 5 (Russian).
[136-7813]

UDC 541.128

STABLE ACTIVITY OF GAMMA-RAY IRRADIATED, ZEOLITE-CONTAINING CATALYST ZEOKAR-2

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, 1981
(signed to press 15 Dec 81) pp 27-30

ALESKEROV, A. M., RUSTAMOV, M. I., MELIKZADE, M. M., FARKHADOVA, G. T. and MAMEDOV, Kh. T., Radiation Studies Sector, Institute of Petrochemical Processes imeni Yu. G. Mamedaliyev

[Abstract] Aleskerov, et al., had shown earlier (1978) that preliminary irradiation of zeolite-containing, petroleum-cracking catalysts (e.g., Zeokar-2), using a gamma-ray K-25 apparatus, substantially increased their catalytic activity. Here, studies are reported of changes in stable activity of prior-irradiated catalysts after their regeneration. Tests showed that under optimal conditions the activity and selectivity of the catalysts suffered only slight change. Even after 30 cycles of "reaction-regeneration", the catalytic activity of Zeokar-2 could be maintained by adding new portions of irradiated catalyst or by repeated gamma-irradiation. References 1 (Russian).
[97-12131]

UDC 541.128.35 : 546.98/07 - 386

SYNTHESIS AND CATALYTIC PROPERTIES OF TRANSITION METAL COMPLEXES WITH LIGANDS THAT ARE FIXED TO OXIDE CARRIER SURFACES, PART 8: CATALYTIC PROPERTIES OF POLYNUCLEAR PALLADIUM COMPLEXES WITH PHOSPHINE LIGANDS FIXED TO SILICA GEL SURFACES

Moscow KINETIKA I KATALIZ in Russian Vol 22, No 6, Nov-Dec 81
(manuscript received 26 Mar 80) pp 1475-1479

SEMIKOLENOV, V. A., LIKHOLOBOV, V. A. and YERMAKOV, Yu. I., Institute of Catalysis, Siberian Division, USSR Academy of Sciences, Novosibirsk

[Abstract] The connection between the number of Pd atoms in an attached polynuclear complex and catalytic properties was studied by disproportionation

of cyclohexane and hydrogenation of olefins. Various products of the disproportionation were analyzed chromatographically. Results showed that the catalytic activity of P_2Pd_2 came from the fixed palladium clusters, not from metal additives. In the hydrogenation reaction, the catalytic activity of the fixed polynuclear complexes increased rapidly, while mononuclear diphosphine Pd complexes showed no noticeable catalytic action in olefin hydrogenation under moderate conditions. The mechanism of hydrogen activation on polynuclear complexes with more than 2 Pd atoms probably does not differ from H_2 activation on particles of the metal. Figures 4; references 8: 6 Russian, 2 English.
[98-12131]

CHEMICAL INDUSTRY

NEW FACILITY CONSTRUCTION PROGRESS REPORTED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Dec 81 p 3

[Article by V. Selyunin, economic reviewer: "Time to Get Started"]

[Text] The industry completed its January-November plan by 100.5 percent. In comparison with the same period of last year the increments were 3.4 percent in production volume and 2.7 percent in labor productivity. The greatest production gains were made in the Ministry of Machine Building for Animal Husbandry and Fodder Production (111 percent of the January-November 1980 level), the Ministry of Mineral Fertilizer Production (109), the Ministry of Medical Industry (108) and the Ministry of Gas Industry (107 percent).

Today, at the year's end, the country's main concern is to put the new capacities into action. It looks like things have taken a turn for the better in capital construction. Just last year, for the first time in many decades, there were no increases in unfinished construction (it even decreased by an equivalent of 1.3 billion rubles). Today, assets are concentrated on construction starts, and from all the signs, construction is going to have a "bumper crop" this year.

The last to leave the construction site are the installers: The bulk of completed facilities are transferred to clients by organizations of the USSR Ministry of Installation and Special Construction Work. At out of 215 output capacities to be surrendered to clients in January-November, the ministry has completed work on 196. This includes 96 state construction projects of priority importance, of which there were 94 in the plan. True, receipts have not been signed off everywhere yet, and adjustment operations are still going on at some facilities, but the state of these new projects cannot be doubted. New facilities that have been placed into production include a coking battery at the Altaysk By-Product Coke Plant, huge mining and concentrate production facilities in Olenegorsk, a finished rolled metal production operation in Cherepovets, an alumina plant in Nikolayev, substantial ammonium production facilities in Tol'yatti and Rossosh', carbamide production facilities with a capacity of almost 2 million tons in Berezniki and Perm', fabric production operations with an output of 111 million square meters in Osh, Orenburg and Lutsk, and much more than can be listed here.

Nevertheless, start-up of most facilities has been postponed to December: Installers will have to make three times more facilities ready for operation in the month than in January-November. Naturally this lopsidedness of the plan has complicated the situation, though judging from the progress being made, the deadlines will be met at most of the facilities. As early as in August the Ministry of Installation and Special Construction Work transferred 30,000 experienced installers from secondary and new construction projects to those in the finishing stages, and clients furnished 15,000 persons to help them. As a rule the work is proceeding in two shifts, and sometimes in three. In a word, according to a ministry estimate not more than 60 out of the 729 construction sites will be carried over to the program for the next year, to include 44 out of 306 facilities deemed to be especially important.

In comparison with previous performance this state of affairs appears rather good, all the more so because with rare exceptions, facilities at which construction is behind will in fact be completed in the first months of 1982. But the problem now is that previous performance is not an adequate yardstick today. After all, the 1982 production plan is much more intensive than that of the past year, and it was drawn up with the idea of unconditional commissioning of all output capacities.

Let us try to analyze the causes of the failures. The installers perhaps deserve the least reproach: They are energetically picking up the slack created by the construction organizations. As an example the "Yefremovkhimstroy" Trust delayed the transfer of a sulfuric acid production operation to the installers for 3-5 months. Subdivisions of the Ukrainian SSR Ministry of Industrial Construction have still not prepared the foundations for a machine at the Kiev Cardboard and Paper Combine, even though according to the norms it takes half a year to install such a machine. The USSR Ministry of Construction was extremely tardy in paving the way for installers at the Nevel' Flax Plant, the Gorkiy Residential Construction Combine and a few other construction sites.

Does this mean that the builders are to blame? In the cases named here, they are. But as a rule the causes of the failures are deeper. Whenever a client has drawn up competent plans and provided for all requirements at the construction site, the builders have rarely let him down. But today, the client is the weakest link in the construction conveyer.

The Ministry of Mineral Fertilizer Production released 15.7 million rubles for a phosphorus meal complex to be placed in operation in Dzhambul. The Ministry of Heavy and Transport Machine Building can handle such a volume, but to everyone's surprise it was discovered that start-up of the facility required completion of work worth another 8 million rubles or more. Need we belabor the point that start-up has been postponed?

The Ministry of Heavy and Transport Machine Building allocated 4.2 million rubles to creation of a steel casting operation in Zhdanov. The builders completed work worth 7.5 million rubles by November, construction is still going on, and who knows when the production operation will begin working?

Our newspaper has exposed an improper practice of the USSR Ministry of Ferrous Metallurgy many times already: It deliberately understates the estimated cost of facilities, hoping that once construction is underway no one is going to stop it, and the bank will furnish extra money. The sector's executives have evidently not made the proper conclusions from this criticism. Recently the Ministry of Heavy and Transport Machine Building placed its first pilot cold-rolling complex into operation in Lipetsk, though not for the 7.5 million rubles estimated by the client, but 12.2 million. It would seem that the trick with the estimated cost paid off--the facility is now working. But the plan requires construction of a second complex of the same kind in Lipetsk, one with a much higher output capacity. Having bogged themselves down with the first facility, builders will fall short at the second facility by precisely the same amount which they had to finish in excess of the plan at the first production operation. In the end, the metallurgists will not receive the more-important output capacities on time.

And what is most unpleasant of all is that such mistakes are, so to speak, time bombs. The 1982 construction program is based on the notion that contractors will be able to release all of their manpower from this year's construction starts for other purposes. But construction that is not finished in December will have to be finished later, thus keeping new construction sites vacant. How can we minimize the consequences of today's failures? The plan for next year is being drawn up now. And, as an example, the Ministry of Heavy and Transport Machine Building will shake down its clients for money to support construction of facilities included in the start-up plan for the first time. It is less concerned about output capacities that were started earlier but not placed into operation this year--who knows, they say, how much money will be required? But in fact it would have been better to do the exact opposite: first allocate resources to projects that are almost finished, and then give what is left over to new projects. Otherwise the outcome would be the same as what happened at the construction site of the Mazheyskiy Petroleum Refinery. One year ago the builders reported the enterprise ready for operation. And yet today, in December, they are still finishing off unplanned projects. This is no surprise, since the client allocated a million rubles while the job has required 5 million thus far, and the end of these extra jobs is nowhere to be seen. Logically, the output capacities will not be placed into operation this year either.

Here is one more lesson. A very important sheet metal shop in Temirtau will not go into operation in December as planned. The client allocated 80 million rubles to this facility in its final year of construction, even though the "Kazmetallurgstroy" Trust, which was given the job, has never been able to complete more than 50 million rubles worth of work at all of its construction projects put together. The Kazakh SSR Ministry of Heavy and Transport Machine Building brought in other organizations on a crash basis, and it prepared housing for 7,000 builders, but it never was able to complete this excessive plan. For similar reasons completion of large output capacities at the Achinsk Petroleum Refinery is being postponed: The program for the final year of construction is more than three times larger than the amount of assets actually assimilated in the previous year.

Planners of the USSR Ministry of Ferrous Metallurgy and the USSR Ministry of Petroleum Refining and Petrochemical Industry who added these projects to the list of construction starts were aware that they would not be finished: Neither facility will go into operation before the third quarter of next year. The intent was simple: Of course, it would have been unrealistic to count on finishing the production capacities, but the very fact that they were included in the plan for finished construction would discipline the builders and encourage them to get on with it. Such tricks must not be permitted in the 1982 plan. The principle of concentrating resources on projects already underway must be understood literally, as a party principle, and not to one's own liking.

Finally, a number of output capacities will not be placed into operation this year due to a shortage of equipment. It is now too late to appeal to the suppliers to adhere to their deadlines. Moreover machine builders were unable to fulfill some of their orders due to a shortage of metal. Under these conditions there can be no justification for sending any of the construction equipment to the construction site. Here is what was reported to the editor's office by Soyuzglavkhimkomplekt Chief A. Kudryavtsev: Back in July the main administration delivered all of the required equipment to construction starts at the Novodzhambul Phosphorus Plant, but the latter's governing board used the equipment, worth 2.5 million rubles for other than its intended purposes, and some of it perished due to poor storage. The same picture can be seen at the Fergana Nitrogenous Fertilizer Plant. These facts deserve the attention of the Ministry of Mineral Fertilizer Production.

There are 2 weeks left until the end of the year. These are the hardest days for builders and installers. With a little more effort, the country will be able to congratulate them on completing the first year of the five-year plan with adequate success.

11004
CSO: 1841/67

FERTILIZER INDUSTRY CONSTRUCTION WORKERS ADOPT ANNUAL PLEDGES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Feb 82 p 1

[Article: "Full Output Ahead of Schedule!"]

> [Excerpts] The socialist pledges of the collectives of construction, installation and planning organizations and enterprises involved in mineral fertilizer production on hastening the commissioning of output capacities in fertilizer industry.

Laborers, engineers, technicians and white collar workers of the "Krasnodarkhimstroy" and "Meleuzkhimstroy" trusts of the USSR Ministry of Industrial Construction, the "Cherepovetskhimstroy" and "Apatitstroy" trusts of the USSR Ministry of Construction of Heavy Industry Enterprises, the "Novgorodkhimstroy" Trust of the USSR Ministry of Construction, a number of organizations and enterprises of the USSR Ministry of Installation and Special Construction Work, planning institutes, the Krasnodar and Meleuzov chemical plants and the Cherepovets "Ammofos", Kirov "Apatit" and Novgorod "Azot" production associations of the Ministry of Mineral Fertilizer Production have decided to initiate a socialist competition to hasten construction of fertilizer industry enterprises and place them into operation as quickly as possible.

The collectives of these enterprises and organizations have adopted the following socialist pledges:

At the Krasnodar Chemical Plant:

Place production capacities into operation totaling 1.4 million tons of complex granulated fertilizers in 1982--a year ahead of the deadline foreseen by the plan.

By improving the organization of construction, introducing advanced skills, making fuller use of machines and mechanisms and reducing the proportion of manual labor, exceed the planned target for growth in labor productivity by 0.5 percent. Have khozraschet teams complete not less than 55 percent of the construction and installation jobs. Complete all construction, installation and initial adjustment operations with grades of not less than "good" and "excellent."

't the Meleuzov Chemical Plant:

Complete construction of a complex producing 1.4 million tons of compound mineral fertilizers and surrender it for adjustment operations ahead of schedule, by 7 November 1982, and have it working by 24 December. Complete 50 percent of the total volume of work by the team contract method, and raise the level of fully prefabricated construction of industrial facilities to 75 percent. On this basis, surpass the target for growth in labor productivity by not less than 0.3 percent.

At the Cherepovets "Ammofos" Production Association:

Make capacities with an output of 300,000 tons of wet-process phosphoric acid ready for operation by 25 December. Surpass the planned target for growth in labor productivity by 0.2 percent in 1982 by introducing progressive processes and fully mechanizing construction.

At the Kirov "Apatit" Production Association:

Make production capacities extracting 2.1 million tons of apatite-nephelite ore ready for operation ahead of schedule, by the 65th anniversary of Great October. Build the main facilities of the complex by the mobile team flow-type production method. Complete the annual commercial construction product sales plan by 29 December. Surpass the planned target for raising the rate of growth in labor productivity by 0.1 percent.

The collectives of the chemical plants and the "Apatitstroyindustriya" Outfitting Production Association will furnish equipment, materials and articles to the construction site according to approved schedules for early commissioning of the pilot complex.

At the Novgorod "Azot" Production Association:

Complete the basic technological operations for the first generation of a compound mineral fertilizer production operation with a capacity of 922,000 tons and have it working by 1 July. Complete the volume of construction and installation jobs planned for 1982 at the second generation of the complex by 20 December, and ensure its commissioning by December of the next year.

The association collective will see that the construction site will receive all supporting equipment, articles and materials in accordance with the schedule.

The "Stroykomplekt" and "Stroyindustriya" trusts, the Novgorod "Promstroymaterialy" Association and the "Novgorodavtodor" Trust will ensure delivery of construction materials on schedule, and the "Novgorodstroytrans" Trust and the oblast transportation administration will ensure delivery of workers and materials to the facilities under construction.

The socialist pledges were discussed and approved at general meetings of the collectives of the enterprises and the construction, installation and planning organizations.

11004
CSO: 1841/113

CHEMISTRY PLAYS MAJOR ROLE IN SCIENTIFIC-TECHNICAL PROGRESS

Kiev PRAVDA UKRAINY in Russian 6 Jan 82 p 1

[Article: "Chemistry for the Ideological Propagandist"]

[Text] The significance of chemical science in industry has grown immeasurably in the modern scientific-technical revolution. Arisal of new sources of energy, creation of various synthetic materials with properties not possessed by natural materials, expansion of their raw material base and use of gas and petroleum in chemical synthetic processes are all associated with advances in chemistry and associated sciences.

Chemistry gets its raw materials from the treasurehouse of nature. Great is the wealth of our subsoil. Before the revolution, however, phosphorites were imported into Russia from distant islands of the Pacific and from Africa, and saltpeter was shipped from Chile.

Today our chemical industry gets all of its raw materials from domestic sources, and in turn it is a tremendous raw material base for all industrial sectors, and an important factor of agricultural development.

Chemical industry has been enriched with modern equipment and with production of many formerly unknown materials, which not only compete with traditional materials but also successfully supplant them.

By using 1 ton of plastic, we can save 1,285 rubles in electrical engineering, 2,570 in motor vehicle construction, 3,870 in instrument making, 1,015 in transport and agriculture and machine building and 1,075 rubles in construction.

By using plastics, we save hundreds of thousands of tons of ferrous and nonferrous metals, and about a million cubic meters of wood and lumber. We now produce more than 1 million tons of chemical fibers and filaments per year, 70 percent of which are used to produce consumer goods. Much attention is being devoted to producing plastic tubing, synthetic rubber and high-quality polymers with specific technical characteristics.

Soviet chemical industry is constantly developing at a preferential rate in comparison with many other sectors and all industry as a whole.

The USSR is second in the world in the total volume of chemical production, and first in mineral fertilizer production.

Chemistry industry of the Donets Basin has become an important element of the national economy. Its raw material base is huge: Coal, combustible gas, table salt, chalk, potassium salts, fluorspar, kaolin, dolomite, cinnabar and much else. Modern Donets chemistry is multifaceted as well: fertilizers and acids, plastics and paints, chlorine, ferrite powders and chemical reagents. The Donets Basin is the Ukraine's leader in production of mineral fertilizers, phthalic anhydride, anthracene carbon black, soda ash and caustic soda, and in vat dye production it is first in the Soviet Union. The largest enterprises of the sector are the Severodonetsk "Azot" Production Association, the Rubezhnoye "Krasitel'" Production Association, the Donetsk Chemical Reagent Plant and the Slavyansk "Khimprom" Production Association.

In the 11th Five-Year Plan chemical industry will witness an increase in its possibilities and tasks in solving the greatest national economic problems associated with supplying the public with food, clothing and footwear and promoting technical progress in industry, transportation and agriculture. Science and practice have demonstrated the high effectiveness of outlays to chemicalize farming. In a number of cases more than half of the yield increment is being achieved owing to mineral fertilizers. The amount of mineral fertilizers being delivered to agriculture increased by almost three times in the last 15 years. About 40 percent of their quantity are represented by nitrogenous fertilizers, 27 percent are phosphate fertilizers and 25 percent are potassium fertilizers.

The 26th CPSU Congress posed many new tasks before the country's chemical industry. By the end of the 11th Five-Year Plan chemical and petrochemical industry is to raise its production volume by 30-33 percent and increase production of mineral fertilizers to 150-155 million tons (in arbitrary units), synthetic resins and plastics to 6-6.25 million tons and chemical fibers and filaments to 1.6 million tons. Production of synthetic rubber as natural rubber substitute will grow, and the assortment and quantity of rubber footwear, household chemical articles and photographic materials will improve.

The party believes all-out development of chemical industry to be one of the most important tasks. Completing it is a matter of honor of the sector's laborers.

11004
CSO: 1841/113

ACADEMICIAN URGES ACCEPTANCE OF ATOMIC POWER IN CHEMICAL INDUSTRY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Feb 82 p 2

[Article by Academician Ya. Kolotyrkin: "Atomic Energy for Chemistry"]

[Text] Predictions of the future always contain an element of exaggeration that allows us the liberty of treating them with an air of condescension. Perhaps this is why many feel that apprehensions concerning exhaustion of the petroleum and gas reserves, which provide for about 70 percent of mankind's energy needs, are premature. But the reality of this threat would become obvious once we consider that fuel consurption doubles in an average of every 10-15 years. Consequently this means that the explored petroleum and gas reserves will be enough to cover the needs of only a few decades. This does not mean that they will be pumped out completely from the earth. But their extraction will require almost as much energy as is stored in these forms of fuel. Thus they will have to be automatically excluded from the list of our energy resources.

This prediction raises the question "To be or not to be?" before chemistry in the literal sense. By the end of this five-year plan almost 98 percent of the products of organic synthesis--all sorts of films, plastics, fibers and coatings--will be produced out of petroleum and gas. The demand for these materials is growing so swiftly that the raw material problem will become acute in the next few years. Nonetheless, significant quantities of petroleum and gas are being used in chemistry as common fuel, as a means to achieve the high temperatures required in the processes. The aspiration to do away with such consumption is what gave birth to the question of converting chemical production operations to new sources of energy.

What are these sources? I fear that the answer will not be distinguished by originality: I am referring to the use of atomic reactors as the power source of chemical enterprises. Such a solution promises not only a dramatic decrease in consumption of petroleum and gas as fuel, but also the most economical satisfaction of the demand of chemical production operations for various forms of energy.

Chemistry satisfies a large share of its energy needs with, in addition to fuel, electricity and heat. In this case we often find that electricity carried to chemical combines by power transmission lines at the price of considerable losses is converted back into heat at these combines. But use of nuclear power sources would exclude these losses and eliminate the need for erecting power transmission lines. But the main payoff is elsewhere. Among the sectors having a claim on atomic power, chemistry has the indisputable advantage: Only it is capable of making use of the unique "waste" of nuclear processes--radiation--with a high impact.

Until recently we have interpreted the radiation accompanying nuclear transformations as a necessary evil, one compelling us to implement complex protective measures. But radiation is energy. Moreover, from the standpoint of a consumer such as chemistry, this is highly "concentrated" energy.

In the final analysis the essence of most chemical processes boils down to the same thing: Bonds between atoms must be broken in the molecules of primary substances, and the "fragments" formed must be brought together into the molecules of the end product. But in practice we often find that the conventional means of affecting such substances--high pressure and temperature for example--are unable to surmount the strength of chemical bonds. And so the process we desire cannot be brought into being. Radiation or, in other words, ionizing emissions, contain such a powerful "charge" of energy that they are capable of breaking the strongest bonds in a substance. Therefore the most unusual processes may be carried out by their assistance. And traditional processes may be performed at lower temperatures and pressures, which promises a sizeable payoff.

Of course the problems associated with practical use of radiation have been found to be rather complex: Its destructive power at first seems totally incompatible with the delicate mechanism of chemical reactions. But profound theoretical work and extensive research on the problem by both our sector's main institute , the Physicochemical Institute imeni L. Ya. Karpov, and other organizations have made it possible to create a large number of effective radiochemical processes. Many of them have already left the laboratories and demonstrated their advantages in experimental industrial conditions, meaning that they can now be run on a broad scale.

Take as an example processes in which polymers are modified by radiation. Additional cross-links may be created between the molecules of polyethylene, a material we all know, by means of ionizing emissions. This dramatically improves the material's properties. In particular such cross-linked polyethylene, when used as cable sheathing, not only conserves nonferrous metals but also replaces Teflon, which is so expensive and hard to work. The resulting savings is on the order of 100-200 rubles for each kilometer of insulated cable.

In similar fashion polyethylene tubing may be made capable of carrying hot water. It can also replace metallic tubing in industrial and municipal water supply systems. The demand for such tubing is measured in the tens of thousands of tons. Correspondingly the reserves for economizing on metal are great as well. Irradiated polyethylene may also be used to face steel pipes carrying hot aggressive liquids, thus significantly lengthening their life. Radiation processing improves the characteristics of mixed concrete-polymer materials as well--their strength and their resistance to the effects of moisture, aggressive substances and low temperatures. These properties are especially important in relation to underwater and hydraulic engineering facilities, sea water desalinization plants and chemical enterprises. A radiation process for modifying wood created in our country is raising special interest. It transforms low-grade wood into materials with qualities surpassing those of even oak and beech.

All of these resource conserving processes have now been perfected. But until recently, absence of sufficiently powerful and economic radiation sources hindered their broad introduction. Soviet scientists were the first to demonstrate by their research that the reactors of atomic electric power plants may be used as highly economical sources of radiation. To permit this, they would have to be outfitted with so-called radiation networks--devices which carry gamma-emissions from the reactor core into a radiochemical facility. Our country was the first to develop such networks with an indium-gallium carrier. They have now been serving successfully for a number of years at four experimental reactors.

Calculations show that a radiation network with gamma-power on the order of 100-200 kilowatts may be created at each type "RBMK" reactor operating at, for example, the Leningradskaya AES. In other words it would replace radio-isotope sources requiring 10-20 tons (!) of radium. The annual productivity of a facility with such a network may reach 1,000-2,000 tons of irradiated hot water tubing or 25,000-50,000 cubic meters of concrete-polymer articles. And the economic impact from just these modified materials alone would be 10-15 million rubles per year.

Thus not only the technical possibility but also the economic feasibility of creating radiochemical production operations based on atomic power plant reactors has already been demonstrated. There is a real foundation for creating such operations today. A course toward preferential development of atomic power was charted by the 26th CPSU Congress. In this connection chemists submitted the proposal of outfitting at least one of the power plants now under construction with radiation networks--industrial this time rather than just experimental. In particular they were referring to the Ignalinskaya AES in Lithuania.

This proposal was supported by the president of the USSR Academy of Sciences, Academician A. Aleksandrov. Power engineers displayed interest in it as well: Radiation technology permits fuller use of the possibilities of nuclear fuel and reduction of operating expenses and the cost of the electric power produced. Nevertheless the reactor builders preferred to turn down this task.

Unfortunately there are all the grounds for expecting that bureaucratic problems will continue to delay practical use of radiochemical technology in the future. As an example, radiation processes for waste utilization have been under development in many countries in recent years. Thus irradiation of shavings, chips and sawdust in woodworking industry may increase the pulp yield, resulting in significantly larger quantities of cellulose. And irradiation of wastes containing cellulose carries the promise of a noticeable increase in production of glucose, which is needed for production of feed additives in animal husbandry. The importance of these directions to the national economy is obvious. But once again the same question arises: How and on what basis do we resolve the interests of many different departments?

This question remains open even where the advantages of radiation technology are fully in keeping with the tasks of power engineering. As we know, erection of "atomic boilers" to supply heat to large cities will begin in the present five-year plan. By the logic of it all, these reactors should be outfitted with radiation networks to utilize gamma-emissions, which would be the most universal and economical means by which to decontaminate domestic and industrial wastes, which could then be used as fertilizer. However, this process has not been included in the plans either.

In light of the above, conversion of chemical enterprises to nuclear power sources has not only economic but also legal significance: It would legalize radiation processes as an inseparable part of an integrated technology. Were we to account for the particular features of this technology, and consider the demand for different forms of energy, we could create special reactor designs that would be the most effective in chemical production operations.

Production of a new type of fertilizers--capsulated--may also be organized on the basis of nuclear power sources. Nutrients packaged by a radiation process in polymer capsules would have a longer life and would help to raise crop yields. According to preliminary estimates the economic impact from applying a ton of such fertilizer to, for example, cereal and leguminous crops would be about 3,000 (!) rubles.

The significance of converting to nuclear power would rise another order of magnitude if we consider the principal directions of scientific-technical progress. As we know, one of them calls for assimilation of the production of synthetic liquid and gaseous fuels from coal, shale and bituminous sand. By using nuclear power sources, we would be able to organize closed production cycles and dramatically reduce the discharges of toxic sulfur, nitrogen and carbon oxides into the atmosphere.

Nuclear power sources may play the decisive role in solving the problems of hydrogen production as well. The plans for the future have basically been based on acquiring hydrogen from natural gas and hydrocarbons, though we do have a cheaper raw material available--water. But its decomposition by electrolysis remains expensive. Therefore it is interpreted only as a means of using up "throwaway" energy that becomes available when the consumer load of an atomic power plant drops. Research conducted in recent years has shown that radiation can place water molecules into an excited state, in a sense preparing them for decomposition. This would reduce the cost of electrolytic hydrogen by at least 30 percent.

To be specific, chemical production operations have no alternatives other than conversion to nuclear power sources. This is admitted not only by chemists but also their associates. Moreover, a decision was made 7 years ago to unite efforts with the purpose of creating an experimental industrial atomic power and chemical facility. In addition to producing electric power it was to support production of about 3,000 tons of radiation-modified polyethylene tubing for hot water supply systems. In the last few years there has been extensive research and development, and a plan for a high-temperature reactor with spherical cells was drawn up. Erection of the facility was supposed to have started last year, but construction has now been postponed indefinitely. This threatens solution of the entire complex of problems associated with using nuclear power sources and capitalizing on the advantages of radiation technology. Because of their scale and significance, these problems must become the object of a specific-purpose integrated program conducted under the supervision of the USSR State Committee for Science and Technology. And surveillance over its implementation must be the most effective possible.

11004
CSO: 1841/113

BRIEFS

NEW AIR-FRACTIONATION STATION--Ural machine builders started up production of a new item during the socialist competition in honor of the 60th anniversary of the USSR. A new air-fractionation station has been manufactured at the Sverdlovsk Oxygen Machine Building Plant. It is intended for acquisition of high-purity liquid and gaseous nitrogen and oxygen from air. The new unit is 40 percent more powerful than previous models. The annual economic impact from its use exceeds 14,000 rubles. This year the units will be placed into series production. [By M. Anatol'yev, Sverdlovsk] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Jan 82 p 1] 11004

HERBICIDE PRODUCTION UP--"Exceed the production plan each day"--this is the slogan under which the collective of the Ufa "Khimprom" Association is laboring. Last year it produced and provided agriculture with 5,500 tons more highly effective herbicides than planned. These herbicides were used to weed cereal and industrial crops. Now, due to reconstruction, modernization and improvement of the effectiveness of the work of equipment, the collective has decided to increase production of valuable preparations by 3,500 tons. Rural laborers will receive not less than 1,000 tons of dialin, a new corn weeding preparation. A competition for early completion of the annual plan assumed broad scope in the very first days of this year in the shops and sections. The chemists are running the production processes with high proficiency, and they are surpassing their daily targets. Machine operators of Shop No 9--I. Karavayev, T. Abdrakhmanov and P. Migunov--are achieving high indicators these days. [By I. Payvin, Ufa] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 Jan 82 p 1] 11004

RECYCLED WATER--The Pervomayskiy Chemical Plant, one of the largest in the sector, has been completely converted to a closed water recycling system. The high-capacity thermal desalinization unit started up yesterday was the last unit of the nature-conserving complex. Highly mineralized wastes that had not formerly been treated are now subjected to evaporation. Valuable chemicals are extracted from the resulting solid precipitant, and the hot distilled water is used for industrial needs. Such water conserving complexes, which include mechanical, biological and physicochemical treatment, are to be built during the present five-year plan at a number of major enterprises of chemical industry and other industrial sectors in the country. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Jan 82 p 1] 11004

SULFURIC ACID PRODUCTION--Instead of the 3 months foreseen by the norm, the collective of the Almalyk Chemical Plant needed only 3 weeks to reach the planned output capacity of a new sulfuric acid production complex. Acid production has now doubled at the plant. All mineral fertilizer production lines are now fully supplied with this raw material. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 29 Jan 82 p 1] 11004

BARNAUL RAILROADERS EXCEL--The leading mechanics of the Barnaul Locomotive Depot are now driving the first trains on economized fuel and power. They include Cavalier of the Order of Lenin N. Skripnikov and Hero of Socialist Labor V. Dokukin, A. Glushenko and others. The collective of the Barnaul Rail Car Depot Motor Transport Center began the new year with a good head start. These railroaders are credited with repairing a thousand and a half more air distributors than planned last year. They intend to reach the target of two and a half months of this year by 8 March. A thousand railroaders of the Altaysk department of the railroad are laboring these days under the slogan "Sixty Shock Labor Weeks for the 60th Anniversary of the USSR." The collectives of 20 of the department's stations, to include Zarinskaya, Biysk, Korchino, Gilevka, Len'kov and Ust'-Tal'menskaya, are far ahead of the work schedule. [By N. Il'ichev, Barnaul] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Feb 82 p 1] 11004

YAVAN ELECTROLYZERS--The second half of the series of electrolyzers intended for production of chlorine and caustic soda was started up at the end of last year at the Yavan Electrochemical Plant. The first strand of a highly intricate production complex has now gone into operation. The collective of chemists is now faced with the task of raising it to its planned output capacity as quickly as possible. With time, this chlorine and caustic soda production operation will fully satisfy the raw material demands of all of the other production operations at the plant. [Excerpt] [Dushanbe KOMMUNIST TADZHIKISTANA in Russian 13 Jan 82 p 1] 11004

CSO: 1841/113

BRIEFS

CHEMICAL CONSTRUCTION ON SCHEDULE--Builders of the Severodonetsk "Promkhimmontazh" Trust placed about 20 industrial facilities into operation this year. And now a new labor victory--the annual plan for construction and installation was completed ahead of schedule, and more than 30 million rubles of capital investments were assimilated. A socialist competition in honor of the 60th anniversary of the USSR has assumed broad scope in the trust. Examples of shock labor and high work quality can be found in the teams led by A. Gadiyak, A. Chebotarev, G. Zarutskiy and others. A decision has been made to do extra construction and installation worth 3 million rubles in December. [By V. Mikhaylichenko, Voroshilovgrad Oblast] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Dec 81 p 1] 11004

CHEMICAL INSTITUTE REWARDED--The labor of workers of the Moscow Scientific Research Institute of Organic Semifinished Products and Dyes has been invested in the products of many sectors. Production of motion picture film and plastics, quantum electronics and light industry, perfume manufacture and machine building--such is the sphere of application of the developments of the capital's chemists. The collective of the scientific research institute has been awarded the Order of the Red Labor Banner for its successes in scientific research and production aimed at developing precision organic synthesis industry. A solemn meeting devoted to presentation of this award to the institute was held on 24 December in Moscow. USSR Council of Ministers Deputy Chairman L. A. Kostandov congratulated the collective and secured the order to the institute's banner. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 25 Dec 81 p 3] 11004

PHOSPHORUS SALT PLANT--Chemists of the Chiryurtovsk Phosphorus Salt Plant are celebrating the enterprise's 10th anniversary. The collective's gift of labor on this date was completion of the annual plan in relation to the principal technical-economic indicators. The collective produced 22,100 tons of feed precipitate--a stimulatory feed additive. Another 1,100 tons of this valuable product will be produced before the end of the year. All new shops, sections and teams of Dagestan enterprises are reporting attainment of their target. More than 500 workers of the flagship of Dagestan industry, the Plant imeni Gadzhiyev, have already completed their personal annual plans. Among them are the best producers of teams led by V. Mirzoyev, N. Abashin and V. Kovalev, and the victors of the first weeks of the labor competition in honor of the 60th anniversary of the USSR's formation. [By O. Sanayev, Makhachkala] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 27 Dec 81 p 1] 11004

PULP-AND-PAPER PLANT--The first generation of a pulp-and-paper plant of the Ust'-Ilimsk lumber complex has been made ready for operation. Output capacities capable of producing another quarter of a million tons of bleached pulp, necessary for production of high-quality paper, will begin working in just a few days. It took just a year for builders, installers and operators of this giant of wood-chemical industry in the country's east to double its potential. Construction projects underway include, besides a second-generation pulp-and-paper plant, a timber transloading base capable of handling a million cubic meters of timber, and two log receiving and trimming lines. The complex's work goes on as its second generation is prepared for operation. Operators are laboring here together with the builders and installers. The "worker relay," which came into being during erection of the first generation of the complex, is helping the laborers not only to meet the schedule but even to anticipate it. [By V. Khodiy, Ust'-Ilimsk, Irkutsk Oblast] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 30 Dec 81 p 1] 11004

KREMENCHUG INDUSTRIAL CARBON--The Kremenchug Industrial Carbon Plant has earned its name as an enterprise producing high quality products. Its production processes are constantly undergoing improvements, equipment and apparatus are being updated, and plant standards have been introduced. As a result, all three types of carbon black produced by the plant and intended for production of tires and other industrial rubber articles bear the honorary pentangle. It has been many long years since the collective has received a complaint from consumers. [By A. Vyatkin] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Jan 82 p 2] 11004

GASOLINE PRODUCTION--Dozens of cubic meters of crude condensate are now being processed into gasoline at the Yakutsk-Mastakhsk gas deposit, one of the largest. Yakutsk gasoline has few toxic impurities, it does not produce carbon deposits, and addition of light fractions makes engine starting easier at low temperatures. But the main advantage is that fuel need not be transported thousands of kilometers. This year the facility at the Mastakhsk deposit for producing gasoline out of condensate will be expanded. The improvements will noticeably raise its output capacity. [By V. Fedorov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Jan 82 p 2] 11004

CSO: 1841/67

MINERAL FERTILIZER INDUSTRY IN 11TH FIVE-YEAR PLAN

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 82 pp 3-9

PETRISHCHEV, A. G., minister of the USSR mineral fertilizer industry

[Abstract] During the 10th Five-Year Plan, emphasis has been on developing efficient production, increasing output (32.7% overall) and increasing the quality and diversity of both fertilizers and pesticides. During the 11th Five-Year Plan, the emphasis is on higher-grade and more concentrated products plus more efficient utilization of plant facilities, raw materials and energy. Projections call for the conservation of around 7.5 million Kwatt-hours, due mainly to new technologies in ammonia, carbamide, and large-scale methanol production. By 1985, agriculture will require an estimated 120 million tons of mineral fertilizer, including 5 million tons of additives. The overall increase projected for 1985 is 45%; however both nitrogen and phosphorus fertilizers are expected to increase by around 50%. Much of the developmental work will be performed by joint programs with the major state research centers. Priority projects include the purification and concentration of intermediate products, such as phosphoric acid, especially those obtained from lower-grade ores and reactants.
[129-12027]

UDC 66.012-52 658.011.56

AUTOMATION OF CHEMICAL PRODUCTION EQUIPMENT

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 81 pp 14-15

OLERINSKIY, B. I., SINITSYN, A. I. and GUREVICH, M. A., candidates of technical sciences, and MALKOV, Ye. M., engineer

[Abstract] Equipment produced at the Leningrad Scientific Research Institute for Chemical Machine Building includes reaction vessels with hermetic drive and piston compressors, with remote control and monitoring systems and safety devices. Technical and economic features of the equipment are discussed. Such equipment is used to produce high-density

polyethylene with cost effectiveness while lightening the labor input. Factors involved in production include careful preparation of the job description of the machinery, its relation to other equipment, and evaluation of functional and structural parameters after installations are completed. Several specific applications are described.
[96-12131]

UDC 631.81

MINERAL FERTILIZER INDUSTRY FOR AGRICULTURE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, Jan 82 pp 3-5

PETRISHCHEV, A. G., minister for mineral fertilizer production

[Abstract] To help solve chronic food production problems, preparation of mineral fertilizers has been placed under the control of a separate ministry, whose head is reporting in this article progress in the production of various categories of mineral fertilizers and chemicals for plant protection. He relates increases in per hectare application of these chemicals to increased yields of grains, sugar beets and cotton. Fertilizers discussed include ammonia and anhydrous ammonia and other nitrogen, phosphorous and potassium compounds. Qualitative improvements include more regular sizes in granulation and caking prevention for easier transport and application. Further advances in technology will require intensifying research. Results of plan fulfillment are presented.
[119-12131]

UDC 630*863.5:331.876

NUTRIENT YEAST PRODUCTION QUOTAS EXCEEDED IN 1981

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, 1982 (signed to press 18 Jan 82) p 1

[Abstract] Participants in the All-Union Socialist Competition were honored for producing over a million tons of yeast protein. The top producers and the amounts by which they exceeded their quotas for the first eleven months of 1981 are these: Bobruysk Hydrolysis Collective, 737 tons of high quality yeast protein; the Rechitsa Factory, 414; Kropotkin, 245; and Fergana, 173 tons. Each ton of yeast protein is the equivalent of 1.5-2.5 tons of meat (live weight) or 25,000-35,000 eggs. Comrade L. I. Brezhnev, at the November, 1981 plenum identified food production as the most important problem in the entire 11th Five-Year Plan. At this same meeting, it was mentioned that each branch of industry, each union republic, kray, oblast city and rayon must participate in solving the

problems associated with the large-scale development of the economic potential of the farming industries, the energy-fuel complexes, and with the improvement of the Soviet life-style.
[130-12027]

UDC 630*863:658.26.001.8

BASIC DIRECTIONS IN UTILIZATION OF SECONDARY ENERGY RESOURCES IN MICROBIOLOGICAL INDUSTRY

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian
No 1, 1982 (signed to press 18 Jan 82) pp 2-3

DENISOV, L. N., Main Administration for the Microbiological Industry

[Abstract] "Our furthest advances," said Comrade L. I. Brezhnev, "will increasingly depend on skillful and efficient utilization of our natural resources: labor, capital, fuel and raw materials, and the products of our fields and farms." The microbiological industries have many processes where conservation techniques may be applied. For example, about 30% of the thermal energy used in the hydrolyzers is for heating water. Thermal energy from the residual hot water and steam, as well as that from the vacuum evaporators and other units, can be recycled. Another example is the protein-vitamin concentrators, where about 60% of the total electrical energy requires is ultimately lost. Thermal energy can be recovered after sterilization by cooling the apparatus, contents, pipes, and other fixtures to 32-36°C. Several institutes, such as the All-Union Scientific Research Institute of Biotechnology, are collaborating with the factories to develop new equipment including heat exchangers and to establish the most practical methods of recovering and utilizing waste heat. A phase-change heat exchanger, which operates at a stable temperature compatible with the fermentation units, has high priority.
[130-12027]

UDC 541.64 : 546.18

EFFECT OF PHOSPHORUS ON HIGH TEMPERATURE PYROLYSIS OF POLYMETHYLMETHACRYLATE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 1, Jan 82 (manuscript received 13 Aug 80) pp 63-66

GAL'CHENKO, A. G., KHALTURINSKIY, N. A., SAKHAROVA, A. A., POPOVA, T. V., FRUNZE, T. M. and BERLIN, Al. Al., Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] The breakdown of polymethylmethacrylate (PMMA) containing various phosphorus compounds, and related gas formation and the temperature of polymer surface layers, were studied using copolymers of methylmethacrylate and diallymethylphosphonate, and using phosphorus-containing PMMA. The effect of environmental temperature on gas formation and on the polymer surface temperature showed that the presence of phosphorus brought temperature increases on the polymer surface, and decreases in gas formation. Thus the introduction of phosphorus into PMMA compounds significantly reduced the rate of polymer breakdown. Figures 3; references 9: 7 Russian, 2 English.
[104-12131]

ELECTROCHEMISTRY

UDC 541.13

EFFECT OF PLASTICIZING SOLVENT ON ELECTRODE SELECTIVITY OF VALINOMYCIN MEMBRANE FILMS

Moscow ELEKTROKHIMIYA in Russian Vol 18, No 1, Jan 82
(manuscript received 21 Jan 81) pp 59-68

MIKHEL'SON, K. N., GREKOVICH, A. L., MATEROVA, Ye. A. and FILIPPOV, S. Yu.,
Leningrad State University imeni A. A. Zhdanov

[Abstract] An equation was developed for the potential of a membrane containing neutral complex components (which include the solvent). The theoretical ratios were verified experimentally. Selective properties of the membrane were tied to properties of the solvent and the concentration of neutral complex components. Calculations are presented to show theoretical membrane selectivity and a coefficient of selectivity, with the conclusion that the solvent's contribution to electrode selectivity of the membrane depends both on the nature of the solvent and on the concentration of the complexon. A polyvinylchloride membrane with neutral valinomycin was used with tributyl-, trihexyl- and trioctyl- phosphate extragents containing an electron-donor phosphoryl group, to test the calculated results. Experimental data coincided with theoretical expectations, and permitted the authors to develop equations of selectivity as a function of membrane composition for complexes of lithium with cesium and potassium. Figures 4; references 7: 5 Russian, 2 English.
[111-12131]

UDC 541.13 : 577.37

MECHANISM OF REVERSIBLE ELECTRIC BREAKDOWN OF TWO-PLY LIPID MEMBRANES IN PRESENCE OF UO_2^{2+}

Moscow ELEKTROKHIMIYA in Russian Vol 18, No 1, Jan 82
(manuscript received 10 Dec 80) pp 98-102

CHERNOMORDIK, L. V., SUKHAROV, S. I., ABIDOR, I. G. and CHIZMADZHEV, Yu. A.,
Institute of Electrochemistry, USSR Academy of Sciences, Moscow

[Abstract] Processing of a two-ply lipid membrane made of azolectene and phosphatidylserine with UO_2^{2+} ions brings increased electric durability,

but under certain conditions reverse resistance is reduced by a factor of more than 10^7. This phenomenon was investigated for conductivity through a 1 mm opening in a bichamber teflon cell at 30°C. Measurements for capacitive values were complicated by a strong conductive flow, where it was difficult to control capacitance. Electric breakdown was determined to have a local nature. There was a rapid initial increase in current change, followed by stabilization. The cause of increased breakdown was traced to the conentration of uranyl ions that brough a rapid increase in conductive faults in the membrane. Figures 5; references 5: 2 Russian, 3 English.
[111-12131]

FERTILIZERS

UDC 633.511 : 631.811.98

REGULATING COTTON GROWTH AND DEVELOPMENT WITH DIMETHYLMORPHOLINIUM CHLORIDE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, Jan 82 pp 35-36

ASROROV, K. A., RASULOV, S., candidates of biological sciences, and PROKOF'YEV, A. A., doctor of biological sciences, Department of General Cotton Genetics, TaSSR Academy of Sciences; and Institute of Plant Physiology, USSR Academy of Sciences

[Abstract] Studies were made of the effect of dimethylmorpholinium chloride on growth, development and fruit bearing of cotton on the No. 4 Sovkhoz, Yavanskiy Rayon, in the Kurgan-Tyube Oblast region of the Tajik SSR in 1977-1980. On a control plot, hand chopping was performed, while at about the same date in August the test plot was sprayed with growth regulator. Results showed that the compound totally prevented formation of later buds, and hastened boll formation by 15-20 days, resulting in 8-12% higher yields. No effect on cotton quality was noted. References 3 (Russian).
[119-12131]

UDC 630*863.1.002.3.004.4

EXPERIMENTAL LIQUID STORAGE OF NITROAMMOPHOS

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, 1982 (signed to press 18 Jan 82) p 20

VOLOKITIN, V. G., group manager, All-Union Scientific Production Association of the Paper-Cellulose Industry, TATARTSEV, S. S. and PERSHIN, V. I., engineers, Vyborg Paper-Cellulose Plant

[Abstract] Nitroammophos is a yeast nutrient salt containing phosphorus, nitrogen and potassium, and is used at the Vyborg Paper-Cellulose Plant to grow fodder yeasts which contain P, N and K. A liquid process was tested by the authors' laboratories to retain the K-containing salts, which have been subject to loss. A 25 m^3 volume of postfermentation mash is poured into a 40 m^3 vat then 25 tons of salt is added. The clarified solution

($19\ m^3$) is drawn off once every 1 to 2 days. In comparison with the older method, this new process reduces the losses of undissolved fertilizer with the slime. This process results in a savings of 19,000 rubles annually and may be recommended for introduction into the paper-cellulose, hydrolysis and microbiological industries.
[130-12027]

UDC 547.87 + 547.024

1,2,4-BENZOTHIAZINILES--NEW TYPE OF FREE RADICALS CONTAINING SULFUR AND NITROGEN

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 17, No 12, Dec 81 (manuscript received 11 Jun 81) pp 2619-2620

MARKOVSKIY, L. N., TALANOV, V. S., POLUMBRIK, O. M. and SHERMOLOVICH, Yu. G., Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] 1-Chloro-3-phenyl(trichloromethyl)-1,2,4-benzothiadiazines can be reduced with powdered Na in benzene or tetrahydrofurane (THF) to yield stabel free radicals--benzothiadiaziniles. The same radicals can be obtained by oxidation of 2H-1,2,4-benzothiadiazine with PbO_2 in presence of K_2CO_3. In benzene or THF, these free radicals are stable for days. Air oxygen appears to have no effect on them. These radicals appear to be of the π-electronic type: their stability is due to the delocalization of an unshared electron on the bivalent sulfur atom. References 8: 2 Russian, 6 Western.
[133-7813]

ION EXCHANGE PHENOMENA

PROSPECTS FOR PREPARING FIBROUS ION-EXCHANGE MATERIALS FOR GAS PURIFICATION TECHNOLOGY

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 82 pp 22-24

ENNAN, A. A. and VLINDER, V. I.

[Abstract] As a result of new developments in their production, such as high surface reactivity and low drag, ion exchange materials are currently being considered for application in gas scrubbing units. Adsorption of gases, e.g., NH_3, HCl, HF and SO_2, is more rapid with ion-exchange fibers (cellulose, polyvinylalcohol, polypropylene, saponified polyacrylonitrile and carboxyl cationic resins) than with ion-exchange resins—due possibly to higher accessibility of functional groups. In all cases, the activity of the material toward the sorbate gas increases strongly with increasing moisture content. A single layer of adsorbent is not particularly efficient for removing contaminants in aerosol form; hence equations are developed to determine the required number of layers of adsorbent. The actual application of these or similar materials is contingent on the scrubbing efficiencies and economic effectiveness together with the technological sophistication of the gas scrubbing installation.
References 24 (Russian).
[129-12027]

UDC 543.544

USING RADIATION-RESISTANT RESINS TO SEPARATE RADIOACTIVE ELEMENTS BY DISPLACEMENT CHROMATOGRAPHY METHOD, PART 3: SEPARATION ON CATIONITES KU-4, KU-6 AND KU-160 WITH AID OF NITRYLOTRIACETIC ACID

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 56, No 1, Jan 81
(manuscript received 11 Feb 81) pp 220-223

CHUVELEVA, E. A., FIRSOVA, L. A., KHARITONOV, O. V. and NAZAROV, P. P., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] Nitrylotriacetic acid, which is widely used to separate rare earth and trans-plutonium elements, was used to separate neodymium and

prazeodymium on KU-4, KU-6 and KU-160 cations in the zinc-form using a 0.1 mol/liter solution of NTA at about 70° C. This procedure was as effective as the widely used method with KU-2 cation, and had the advantage of avoiding the negative effect of using diethylenetriaminepentaacetic acid as the eluent. Figures 2; references 8: 6 Russian, 2 English. [123-12131]

NITROGEN COMPOUNDS

UDC 546.431.4.577.743.1

REACTION OF PENTAMETHYLENEDIBROMIDE WITH SECONDARY AMINES, AND CERTAIN CONVERSIONS OF TETRADERIVATIVE AMMONIUM SALTS OBTAINED

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, 1981
(signed to press 15 Dec 81) pp 56-60

MOVSUMZADE, M. M., GURBANOV, P. A., METAKSA, I. P. and ASKEROV, N. D.,
Azerbaijan Petroleum and Chemistry Institute imeni M. A. Azizbekov

[Abstract] Pentamethyldibromide reacts with secondary amines to form corresponding quaternary ammonium salts. With dialkylamines, corresponding N,N-dialkylpiperidinium bromides were formed. With morpholine and piperidine, azospiro- compounds were obtained. Alkaline decomposition the quaternary ammonium salts yields piperidine derivatives. Both thermal and alkaline processes produce the same N-alkylpiperidines, except in the case of azo-spiro- compounds, where thermal separation does not take place, but alkaline separation results in an elimination reaction. References 9: 5 Russian, 4 Western.
[97-12131]

UDC 541.128

REDUCING MOLECULAR NITROGEN USING $Cr(OH)_2$--$Mo(OH)_3$ HYDROXIDE

Moscow KINETIKA I KATALIZ in Russian Vol 22, No 6, Nov-Dec 81
(manuscript received 9 Jul 80) pp 1401-1406

BURBO, Ye. M., DENISOV, N. T. and KOBELEVA, S. I., Department of the Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka

[Abstract] The chambers of a bichamber vessel were filled with a methanol solution containing Cr and Mo, and with water and a KOH solution in methanol. After injection of nitrogen and heating, the components were mixed and stirred at a controlled temperature. The kinetics of hydrazine reduction were studied in an argon medium, using spectrophotometry and

titration with an NH_4VO_3 solution. Products of the reaction contained about 5 times as much ammonia as hydrazine. Separate tests showed hydrazine reduction at 10 times the speed, using $Cr(OH)_2$--$Mo(OH)_3$, compared to use of chromium hydroxide alone. Increasing molybdenum in the system brought increased yields up to a maximum of 10% Mo(in association with Cr^{2+}). The kinetics of reducing agent consumption were the same in either an argon or nitrogen medium. It was determined that ammonia could be formed in hydroxide systems both through intermediate formation of hydrazine, and through an immediate, one-step reduction of nitrogen. Figures 5; references 10: 7 Russian, 3 English.
[98-12131]

UDC 542.942.7

KINETICS AND MECHANISM OF REDUCING NITROGEN IN $FeCl_3$+PhLi SYSTEM IN PRESENCE OF LITHIUM HALOGENIDES

Moscow KINETIKA I KATALIZ in Russian Vol 22, No 6, Nov-Dec 81
(manuscript received 9 Jul 80) pp 1457-1464

BAZHENOVA, T. A., GRYUZEL', M., LENY, G., SHILOV, A. Ye. and SHILOVA, A. K., Department of the Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka; National Center for Scientific Research, Paris, France

[Abstract] To test the hypothesis that the effect of salts in nitrogen reactions is associated with accelerated formation of active forms of iron, an anhydrous ferric chloride was combined with lithium phenyl which contained wither LiBr of LiI. The $FeCl_3$ in an ether solution was gradually added to the lithium compound at -20°C, with rapid stirring. After heating to 20°C, spectrophotometric and titration studies were made. A rapid color change evidenced an autocatalytic process in which lithium bromide decreased the period of induction and hastened the reaction. The catalyst was a rather stable product of the reaction. Accumulation of hydrazine in the presence of varying amounts of lithium idodide showed that the reaction speed and the salt concentration were directly related. Kinetic data show that the active particle in the reaction with molecular hydrogen is a complex of Fe(O). Figures 5; references 12: 8 Russian, 4 Western.
[98-12131]

UDC 547.873'787'781.07 : 542.952

REARRANGEMENTS IN HALOGENALKOXY(THIO,AMINO)-sym-TRIAZINES, PART 10: SYNTHESIS AND REARRANGEMENT OF 2-DIMETHYLAMINO-4-(2-ACYLHYDRAZINO)-6,7-DIHYDROOXAZOLO-[3,2-a]-sym-TRIAZINES

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 12, Dec 81
(manuscript received 9 Dec 80) pp 1689-1692

DOVLATYAN, V. V., KHACHATRYAN, N. Kh., GOMKTSYAN, T. A. and SAAKYAN, S. M.,
Armenian Agricultural Institute, Yerevan

[Abstract] Continuing earlier studies, the authors examined the reaction of 2-dimethylamino-4-(2-chloroethoxy)-6-(2-acylhydrazino)-sym-triazine, which under thermolysis can form oxazolo-, imidazo-, and triazinotriazine. In the reaction of a quaternary salt with ethylene chlorhydrin in the presence of alkali at low temperature, dihydrooxazolo-sym-triazine was formed which, upon heating at 200°C, regrouped to form dihydroimidazo-sym-triazine. Details of the reactions which produced similar compounds are described in the experimental section. Proton magnetic resonance and mass-spectral analysis was used to confirm the products obtained. References 2 (Russian).
[101-12131]

UDC 547.781'821.07

UNUSUAL CASE OF IMIDAZO[4,5-s]PYRIDINE DERIVATIVE FORMATION

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 12, Dec 81
(manuscript received 27 May 81) p 1695

YUTILOV, Yu. M. and SHCHERBINA, L. I., Institute of Physical Organic
Chemistry and Carbon Chemistry, UkSSR Academy of Sciences, Donetsk

[Abstract] Heating 1-benzyl-3-amino-1,4-dihydropyridoneimine-4 with elementary sulfur at 150-160° C for 12 hours formed 2-phenylimidazo[4,5-s]-pyridine with a 35% yield. A 56% yield of imidazopyridine was also obtained at 250-260° C for 6 hours.
[101-12131]

UDC 546.666.185

STUDY OF ERBIUM HYPOPHOSPHATES

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 1, Jan 82 (manuscript received 6 Apr 81) pp 81-84

MIRONOVA, V. S. and TANANAYEV, I. V., Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences

[Abstract] Mixtures were made with a 0.05 mol/liter concentration of erbium nitrate, and varying concentrations of either hypophosphoric acid or sodium hypophosphate. Solid phases thus obtained were filtered and washed in ice water, alcohol, and ether, then dried and analyzed. Erbium content was determined with a reverse titration method using zinc chloride in a urotropin buffer solution with a methylthymol blue indicator. Results showed that all mixtures containing hypophosphoric acid formed a crystalline erbium hypophosphate with the composition $ErHP_2O_6 \cdot 4H_2O$. Various neutral and mixed erbium hypophosphates were obtained when sodium hypophosphate was used, depending on its concentration. Neutral erbium hypophosphates were in amorphous forms, while mixed ones were crystalline. A thermographic method uas used to determine heat resistance of the compounds. X-ray-phase analysis showed that the hypophosphate anion broke down into P^{III} and P^{V} at temperatures between 300 and 600° C, with resultant oxidation and formation of a pyrophosphate anion. Heating for 2 hours at 800° C, and subsequent chromatography, showed spots of ortho-, pyro- and polyphosphates anions of erbium. Figures 3; references 7: 3 Russian, 4 Western.
[114-12131]

UDC 541.128

QUANTUM CHEMICAL STUDY OF REACTIONS CATALYZED BY METAL COMPLEXES, PART 4: REACTION OF PHOSPHINE COMPLEXES PdL_n, Pd_2L_2 and PtL_2 WITH HYDROGEN

Moscow KINETIKA I KATALIZ in Russian Vol 22, No 6, Nov-Dec 81
(manuscript received 10 Nov 80) pp 1431-1437

GRITSENKO, O. V., BAGATUR'YANTS, A. A., MOISEYEV, I. I. and KALECHITS, I. V., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences; Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences, Moscow

[Abstract] Quantum chemical study was made of the reaction of H_2 with palladium complexes containing a binuclear Pd--Pd bond; they were compared to tests of mononuclear palladium compounds, which do not react with H_2, and with platinum complexes where a dissociative bond with H_2 occurs. Calculations based on a linear model focussed on the complexes Pd_2L_2, ML_n and Pd_2L_2 with molecular hydrogen, and dihydride complexes H_2ML_n and $H_2Pd_2L_2$. The first was regarded to have a low-energy Pd--Pd bond in a linear molecule, indicating an associative nature. In the second, binuclear phosphine complexes of Pd(0) had more in common with molecular hydrogen than analogous mononuclear complex of Pd(0) and Pt(0). Polynuclear Pd compounds brought increased numbers of Pd atoms in the cluster that would lead to situations in which the H atom could react with several Pd atoms at the same time. Figures 2; references 9: 5 Russian, 4 English.
[98-12131]

UDC 547.269

REACTION OF ARACYL- AND CARBOALKOXYMETHYLSELENONIUM SALTS WITH NUCLEOPHILIC REAGENTS

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 17, No 12, Dec 81 (manuscript received 2 Mar 81) pp 2552-2558

MAGDESIYEVA, N. N., KYANDZHETSIAN, R. A., KIRPICHENOK, M. A. and CHOBNIKOVA, N. G., Moscow State University imeni M. V. Lomonosov

[Abstract] Reactions of $R_2Se^+CH_2CORX^-$ ($\underline{I}$) type salts with tertiary amines, substituted hydrazines and triphenylphosphine were studied. Under mild conditions triethylamine demethylated $\underline{I}$ yielding α-methylselenocarbonyl compounds. The reaction rate depended primarily on the anion X, while the yield of methylselenocarbonyl compounds was related to the substituent R(R^1 or R^2). Evaluating the effect of the structure of α-carbonyl substituted selenonium salts on their reactions with nucleophilic compounds, synthesis of diethyl- and methylphenylselenonium salts was attempted by reacting respective selenides with ethylbromoacetate and phenacyl bromide.

However, in place of the expected selenonium salts, the products were α-ethylseleno- and α-phenylselenocarbonyl compounds formed evidently from the originally expected salts. This reaction could be used as a preparative method for α-selenated ketones and complex ethers. It was shown that triethylamine splits α-carbonyl substituted dimethylselenonium salts preferentially at the Se-methyl bond; triphenylphosphine is capable of splitting them at either the Se-methyl or Se-CH_2COPh bond, the latter being the preferred site. References 19: 8 Russian (1 by Western author), 11 Western. [133-7813]

UDC 546.4/9:547.491.5

METAL SELENOCYANATES

Moscow USPEKHI KHIMII in Russian Vol 51, No 1, Jan 82 pp 40-56

SKOPENKO, V. V., TSINTSADZE, G. V. and IVANOVA, Ye. I., Georgian Polytechnic Institute imeni V. I. Lenin, Tbilisi

[Abstract] The 1970-1979 literature which deals with metal-SeCN compounds is reviewed. Stability constants for complexes of Se with such metals as Hg, Cd, Zn, Co, Tl, In, V and others are given for a variety of solvents, for example water, acetone, dimethylformamide, dimethylsulfoxide and CH_3CN. The solvent exerts a significant effect; the complexes are most stable in acetone. The presence of ligands containing donor-acceptor N atoms, such as amines, also strongly increases the compound stability. Compounds such as $K[CuR_2SeCN]$, where R = pyridin-2-carbonic acid, have been synthesized. In this case, the SeCN-group is bonded by weak bonds to the Cu through Se. Complexes containing two or more types of ligands have also been prepared. The structures, bonding energies, and configurations of both types of compounds have been evaluated with various types of NMR, ESR, IR and other techniques. Consideration is also given to structures containing an SeCN group and a metal-phosphorus or metal-carbon bond. References 156: 74 Russian, 82 Western.
[127-12027]

ORGANOPHOSPHORUS COMPOUNDS

UDC 542.91 + 547.1.118

SYNTHESIS OF CERTAIN FIVE-MEMBERED CYCLIC PHOSPHORUS DERIVATIVES

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, 1981
(signed to press 15 Dec 81) pp 41-45

GADZHIYEV, G. Yu., ALEKPEROV, G. I. and PUDOVIK, M. A., Kirovabad State Pedagogical Institute imeni G. Zardabi; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan'

[Abstract] 2-Alkylhydrazonoformylphenols were reacted with dioxy-, oxaza- and diaza-phospholanes which have a diethylamino group on the phosphorus that accounts for their high phosphorylizing activity. Despite the presence of several functional groups in the hydrazone molecule, the reactions were selective at the hydroxyl group, with formation of diethylamine. The structure and composition of the compounds derived was determined by element analysis and infrared and nuclear magnetic resonance spectroscopy of ^{1}H and ^{31}P. Two new derivatives of phosphorus were obtained: 2-dimethylamino-2-thioxo-3-phenyl-1,3,2,-oxazophospholane, and 2-diethylamino-3-phenyl-1,3,4,2-oxadiazaphospholene-4. References 11: 4 Russian, 7 English.
[97-12131]

UDC 548.737

STRUCTURE OF ORGANOPHOSPHORUS COMPOUNDS, PART 21: X-RAY STRUCTURE AND SPECTRAL ANALYSIS OF 1-TRIPHENYLPHOSPHAZO-1-DIMETHYLAMINO-2,2-DICYANOETHYLENE

Novosibirsk ZHURNAL STRUKTURNOY KHIMII in Russian Vol 22, No 6, Nov-Dec 81
(manuscript received 18 Jun 80) pp 117-123

ANTIPIN, M. Yu., POLISHCHUK, A. P., STRUCHKOV, Yu. T., YEGOROV, Yu. P., YURCHENKO, V. M., DIDKOVSKIY, V. Ye. and YATSISHIN, A. A., Institute of Heteroorganic Compounds, USSR Academy of Sciences

[Abstract] X-ray structural comparison was made of 1-triphenylphosphazo-1-dimethylamino-2,2-dicyanoethylene and 1-triphenylphosphazo-1-chloro-2,2-dicyanoethylene and the results were compared with respect to infra-red and

ultra-violet spectra, and quantum-chemical calculations. A distortion in structure was found that was related to presence of the dimethylamino group. A weakening of double bonds was caused, apparently, by delocalization of electron density in the molecules. Where a phosphazo-group partially left the compound, it was frequently replaced by the NMe_2-group. Comparison of ultra-violet spectra of similar molecules with Ph_3P grouping, with the spectra of these compounds, show the effect on the electron system of aromatic ring to be insignificant. In related dicyanoethylenes where the phosphazo-group is replaced by an amino-group, the $S_0 \rightarrow S_1$ shift is observed in a shorter wave-length area, and is more intensive. Figures 3; references 15: 7 Russian, 8 Western.
[109-12131]

UDC 547.245'.241 + 547.953.1

SYNTHESIS OF BISPHOSPHATIDE ACID DERIVATIVES AND THEIR THIO-ANALOGUES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 17, No 12, Dec 81 (manuscript received 9 Feb 81) pp 2524-2533

PREDVODITELEV, D. A., CHUKBAR, T. G., MALENKOVSKAYA, M. A., RASADKINA, Ye. N. and NIFANT'YEV, E. Ye., Moscow State Pedagogical Institute imeni V. I. Lenin

[Abstract] Synthesis of thio- and dithio analogues of bisphosphatide acids is reported based on easily accessible secondary and tertiary phosphites of 1,2-σ-isopropylideneglycerine. The products were ketals of diglycerophosphates, diglycerothio- and dithiophosphates. Individual products were identified by means of TLC and NMR spectroscopy. Acylation of these ketals was studied leading to the formation of previously unknown bisphosphatide acids and their thio- and dithio analogues. References 21: 14 Russian, 7 Western.
[133-7813]

UDC 547.241

INTERACTION OF PHOSPHORUS PENTACHLORIDE WITH 4-ETHOXY-1-BUTENE

Ivanova IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 24, No 12, Dec 81 (manuscript received 17 Oct 80) pp 1570-1571

KORMACHEV, V. V. and MITRASOV, Yu. N., Department of Organic Chemistry, Chuvash State University imeni I. N. Ul'yanov

[Abstract] Phosphorus pentachloride and 4-ethoxy-1-butene were combined at room temperature in an absolute benzene medium, and the pure white adduct

was then treated with sulfur dioxide. Infra-red, nuclear magnetic resonance of ^{1}N and ^{31}P spectroscopy and element analysis of the vacuum distilled product showed a structure like that of dichloranhydride-2-chloro-4-ethoxybutyl phosphonic acid. The procedure is described in an experimental section. Reference 1 (Russian).
[122-12131]

UDC 661.185.233

SYNTHESIZING QUATERNARY PHOSPHONIUM SALTS WITH LINKED DIENE GROUPS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 12, Dec 81 (manuscript received 29 Jul 81) pp 995-1000

LULUKYAN, R. K., OVAKIMYAN, M. Zh. and INDZHIKYAN, M. G., Institute of Organic Chemistry, Armenian SSR Academy of Sciences, Yerevan

[Abstract] The behavior of butadiene-1,4-dibromo-2-butene dibromide toward tertiary phosphines was studied, showing that the latter's reaction with triphenyl- and tributylphosphines in ether led to formation of a mixture of monophosphonium salts with a double bond at the alpha-beta and beta-gamma positions to the phosphorus. Upon heating the mixture to 100° C in dimethylformamide, pure compounds with an alpha-beta unsaturated bond was formed. Synthesis of linked dienephosphonic salts, from quaternary phosphonium salts with a delta bromine atom, was achieved by reaction with triethylamine in chloroform solution. The melting temperature in the mixture was depressed. Thin layer chromatography was used to determine purity and infra-red spectroscopy to establish structure. Details of the reactions are presented in an experimental section. References 4: 3 Russian, 1 Western.
[124-12131]

UDC 547.221:547.241

FLUOROPHOSPHORYLIDES

Moscow USPEKHI KHIMII in Russian Vol 51, No 1, Jan 82 pp 3-22

TYULENEVA, V. V., ROKHLIN, Ye. M. and KNUNYANTS, I. L., Institute of Heteroorganic Compounds, USSR Academy of Sciences, Moscow

[Abstract] A description is presented of the syntheses and properties of phosphorylides containing fluorine (F) in the "alkylidene" moiety. Excluded from consideration are fluoromethylenephosphoranes and thos phosphorylides in which F is located some distance from the carbanionic center. Four types of syntheses are considered: reaction of P(III) with fluoro-olefins or other organofluoride compound such as α-bromopentafluoroacetophenone and

2,2,2-trifluoroethyliodide; reaction of P(V) phosphorylides with various fluorine compounds; reactions of alkylphosphonic acid ethers, such as the Wittig-Koerner reaction. The stability of these compounds reflects the physical and physico-chemical properties. Ylides of the type $R_3P=C(CF_3)$ containing the trifluoromethyl group are particularly stable. Infrared and mass spectrometry plus ^{1}H, ^{19}F and ^{31}P NMR have been used to elucidate the structural and geometric configurations. The stability of these compounds also influences their reactivity toward reagents such as strong and weak acids, water ethylamine, gaseous halogens, and others. References 87: 28 Russian, 59 Western.
[127-12027]

PESTICIDES

UDC 678.067.7.019.34 678.019.34

CHEMICAL STABILITY OF CARBON-GLASS FIBER PLASTIC IN PRODUCTION OF PHTHALOPHOS PESTICIDE

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 81 p 40

MIKHAYLOV, V. S., candidate of chemical sciences, DREYTSER, V. I., candidate of technical sciences, YURKOVA, I. A., KOZHEVNIKOVA, N. M., TAMAYEVA, L. V. and BELYAYEV, A. D., engineers

[Abstract] Test samples of carbon-glass fiber plastic, in the form of 50 x 30 mm discs and 50 mm tubes with 68 mm inside diameter and 98 mm outside diameter, were made of a carbon cloth, phenol tar and silicon compounds. A heat-hardening epoxy was the bond. After heat treating, the samples were subjected to petroleum solvents and formaldehyde, which are used in phthalophos production. The 15-18% change in durability for the samples was regarded as favorable in comparison to other materials that have been used. Two years of actual industrial use have confirmed these findings. Figure 1; references 4 (Russian).
[96-12131]

UDC 632.95.025.8

INSECTICIDE RESISTANCE OF HARMFUL SPECIES OF LEPIDOPTERA (ANALYTICAL SURVEY)

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, Jan 82 pp 18-21

ROSLAVTSEVA, S. A., doctor of biological sciences, All-Union Scientific Research Institute for Chemical Plant Protection Substances

[Abstract] The article surveys development of resistance to insecticides in certain species of Lepidoptera, such as Chloridea obsoleta and Heliothis armigera, which are serious pests of cotton and tomatoes in the Soviet Union. Resistance to DDT and the impact of the ban on it are discussed for these and other pests in the USA and the USSR. The picture in other areas of the

world is cited as well. DDT effectiveness declined from 90% in 1963 to 40-50% in 1973 in Tajikistan. The cabbage butterfly Pieris rapae was found to have developed resistance to chloroorganic compounds in Leningrad Oblast, while the grape leaf roller moth Polychrosis botrana survives DDT and lindane in the Ararat valley, and the codling moth is resistant in Moldavia. Successful battle against these pests is tied to scientific application of a variety of insecticides in succession, based on study of genetics. References 52: 18 Russian, 34 English.
[119-12131]

UDC 632.95.025.8

RESISTANCE OF GREENHOUSE WHITEFLY TO INSECTICIDES (ANALYTICAL SURVEY)

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, Jan 82 pp 24-27

ABRAMOVA, T. L., All-Union Scientific Research Institute for Plant Pathology

[Abstract] The effects of various organophosphorus insecticides on the greenhouse whitefly Trialeurodes vaporaricum Westw. in various developmental stages was studied. Such compounds were initially very effective, but beginning in the early 1970s reports of reduced mortality began to appear. In 1975 this resistance was recorded in the Moscow, Leningrad and Kiev regions and in Moldavia, and soon from other regions as well. Laboratory tests showed that Malathion resistance reached 244 times original sensitivity by the 11th generation. The imago showed mush less resistance to other compounds: 26.4 to Basudin, 22.2 to DDVP, 79.5 to Ethaphos, etc. Other insecticides aimed specifically at eggs, pupas, images and adults are recommended, including Carbophos, Actellic and various synthetic pyrethroids and pyrethrins. Several growth regulators are also recommended, including Kinoprene, Triirene and others. References 38: 14 Russian, 10 Eastern European, 14 English.
[119-12131]

UDC 632.954 : 633.181

HERBICIDE MIXTURES ON RICE FIELDS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, Jan 82 pp 32-35

AGARKOV, V. D., CHANUKVADZE, R. G., candidates of agricultural sciences, and RUDENKO, P. P., All-Union Scientific Research Institute of Rice

[Abstract] Studies were made in 1977-1980 in field test plots and production operations to determine optimal mixtures of Basagran, Ronstar, Propanid,

Ordram and Saturn herbicides in eliminating weed infestations while preserving the highest possible rice yields. Mixtures included both laboratory and manufactured herbicides. The cost of a Propanid-Saturn mix was covered by the supplementary yield with additional income. Ronstar was found to be less harmful to warm-blooded animals than other compounds tested. With careful irrigation Propanid mixed with Ordram, Saturn or Ronstar had no effect on the rice stands, and no residues were found in the grain. Basagran and an amino salt [2,4-D(2,4-DA) or 2M-4X] proved effective against reed tubers, while Propanid and Ordram, Saturn or Ronstar controlled echinocloa. References 4 (Russian).
[119-12131]

PHARMACOLOGY AND TOXICOLOGY

UDC 615.281:547.743.1.012.1

SYNTHESIS AND ANTIMICROBIAL ACTIVITY OF SOME N-SUBSTITUTED PYRROLIDONE AND PYRROLIDINE DERIVATIVES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 1, Jan 82
(manuscript received 26 May 81) pp 54-58

SEDAVKINA, V. A., MOROZOVA, N. A., CHULKOV, V. F. and KULIKOVA, L. K.,
Saratov University imeni N. G. Chernyshevskiy

[Abstract] In an earlier study it was shown that 2-alkyl-1-(hydroxyalkyl)-pyrrolidines exhibit anitmicrobial activity. In continuation of these studies, novel N-substituted derivatives of pyrrolidone and pyrrolidine were obtained containing fragments of carbamic and sulfanilic acids. Starting 5-alkylpyrrolidones, 5-alkyl-1-(hydroxyalkyl)-2-pyrrolidones and 2-alkyl-1-(hydroxyalkyl)pyrrolidines (I) were obtained by published methods. When I was reacted with benzylisocyanate in toluene, pyrrolidinol carbamates were obtained. Reaction of pyrrolidones and pyrrolidines unsubstituted at the nitrogen atom gave products in which the carbaminic acid radical was directly connected with the heterocycle [for example, 5-propyl-N-(butylcarbamoyl)-2-pyrrolidone]. All compounds obtained exhibited antimicrobial activity when tested against: St. aureus 209 P, E. coli M-17, Pr. vulgaris 30, Ps. aeruginosa 165, C. albicans 45. The most active compounds were derivatives of N-(β-hydroxyethyl)-2-pyrrolidone and N-(β-hydroxyethyl)-pyrrolidine. References 4 (Russian).
[136-7813]

UDC 615.28:547.558.1

ANTIMICROBIAL ACTIVITY OF AZOMETINE AND STILBENE PHOSPHONIUM ANALOGUES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 1, Jan 82 (manuscript received 28 Apr 81) pp 67-70

PATRATIY, V. K., SHEVCHUK, M. I., SIDORCHUK, I. I., BUKACHUK, O. M. and PRODANCHUK, N. G., University of Chernovtsy, Chernovtsy Medical Institute

[Abstract] The goal of the present sutdy was to develop novel antimicrobial preparations containing phosphorus. A series of tetraaryl phosphonium salts was synthesized: phosphonium azomethines, bis-phosphonium azomethines and phosphonium stilbenes. Their antimicrobial properties were tested against: Staph. aureus 209, B. anthracoides 297, Esch. coli, Proteus vulgaris, Salm. typhimurium, Kl. Shynoseleromatis, Strept. viridens and Cand. albicans. All synthesized compounds showed some antimicrobial activity which appeared to be more pronounced against gram positive bacteria than against gram negative ones. The least reactive were: bis-phosphonium azomethine, phosphonium styrene and furyl phosphonium stilbene. References 5 (Russian).
[136-7813]

POLYMERS AND POLYMERIZATION

UDC 541(64 + 183.12)

COPOLYMERIZATION OF DIALKYL ESTERS OF VINYLPHOSPHONIC ACID WITH ACRYLIC ACID

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, 1981
(signed to press 15 Dec 81) pp 73-76

SIDORCHUK, I. I., ABBASOVA, B. G. and EFENDIYEV, A. A.

[Abstract] Studies were made of copolymerization of vinylphosphonic acid diethyl, dibutyl and diisobutyl esters with acrylic acid to determine the nature of certain principles of the processes. Copolymerization was conducted under 10^{-4} vacuum in quartz ampules in the presence of 1% hydrogen peroxide of isopropylbenzene, with a mercury-quartz lamp used to stimulate the reaction with ultra-violet light. The copolymers obtained were dissolved in ethanol, precipitated with diethyl ether and dried under vacuum at 35-40° C. Assay of phosphorus and carboxyl content showed the dependence of linking of the monomers involved on the length and branching of the alkyl radical. References 12: 9 Russian, 3 English.
[97-12131]

UDC 678.674 + 678.85

POLYETHYLENETEREPHTHALATE CONTAINING PHOSPHORUS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 6, Nov-Dec 81 pp 73-80

BORISOV, G., TROYEV, T. and GROZEVA, At., Central Polymer Laboratory, Bulgarian Academy of Sciences

[Abstract] The effects of trans-esterification, polycondensation and side reactions were studied for polyethyleneterephthalate with diethylphosphite, a sodium salt of diethylphosphite, and a bisodium salt of 1,2-dicarbomethoxyethylphosphonic acid as modifiers. For the purposes of increasing fire resistance, diethylphosphite was determined to be unsuitable as a comonomer

for polyethyleneterephthalate. The other two modifiers gave increased fire resistance properties to the compound; the comonomer of bisodium salt provided a greater flame-retardant effect. Figures 8; references 28: 4 Russian, 24 Western.
[99-12131]

UDC 541.64 : 678.742

TEMPERATURE DEPENDENCY OF PROPERTIES OF COMPOSITIONS OF POLYETHYLENE AND PERLITE

Moscow VYSOKOMOLEKULARNYYE SOYEDINENIYA in Russian Vol 24, No 1, Jan 82 (manuscript received 9 Oct 80) pp 149-154

GEVORGYAN, M. A., SEL'SKAYA, O. G., NOVOKSHONOVA, L. A. and SIVERGIN, Yu. M., Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] High density polyethylene with 88% expanded perlite by weight was compared to high density polyethylene mixed with untreated perlite. The compounds were used to make pellets, which were tested for deformation resistance. Thermogravimetric analysis showed that, when heated in air, the polyethylene underwent more rapid thermooxidation than did pure high density polyethylene. Data indicate that the composition materials containing high density polyethylene and perlite that had been specially treated had a durability in the temperature of 298-380K, superior to that of composites filled with untreated perlite. Figures 5; references 9 (Russian).
[104-12131]

UDC 678.746.22.049.91 : 547.595.2

NITROGEN-CONTAINING ANTIPYRENES FOR PRODUCING POLYMERS WITH REDUCED COMBUSTIBILITY

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 82 p 58

CHIRKINA, G. D., NARKEVICH, L. M., SALAKHOV, M. S., KARLIK, V. M., GRISHKO, N. I., PONKRASHKINA, N. D., NAGIYEV, V. A. and ZAGRANICHNYY, V. I.

[Abstract] Diallylisocyanurate tetrabromide and triallylisocyanurate hexabromide (II) were synthesized, then verified by infra-red spectroscopy and element analysis. Also synthesized were N,N'-(*n*-phenylene)-bisimide isomethyltetrahydrophthalic acid (with melting point of 236-234° C) and the corresponding tetrabromide (with melting point of 204-210° C) for the first time. Polystyrene with lowered combustibility was prepared with the new antipyrenes by the block-suspension method. This polystyrene had better physicochemical properties than the industrially-produced polystyrene

modified with tetrabromoparaxylene. The new product had higher viscosity and reduced swelling. Addition of phosphate permitted use of less amounts of the tested compounds, which were non-toxic, non-combustible and explosion-proof. Dialkylisocyanurate tetrabromide and compound II above were also found to give fire resistance to penopolyurethane while preserving its elasticity. References 4 (Russian).
[118-12131]

UDC 678.742.3-134.22.02 : (66-934 + 66,933)

PROPERTIES OF PROPYLENE-ETHYLENE BLOCK-COPOLYMERS OBTAINED ON PERIODIC ACTION AND SEMICONTINUOUS ACTION EQUIPMENT

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 82 pp 60-61

POPOV, V. P., BELOZEROV, V. V. and KUZNETSOVA, N. V.

[Abstract] Block-copolymers of propylene and ethylene were produced following a periodic procedure where, after proplyene polymerization, the pressure in the reactor was reduced and ethylene introduced. The content of ethylene chains in the block copolymer produced was determined by infrared spectroscopy to be less, and the cold resistance greater, than when semicontinuous processes were used. Figure 1; references 7: 5 Russian, 2 English.
[118-12131]

RADIATION CHEMISTRY

UDC 547.68:542.943

REACTIVITY OF SOME CONDENSED AROMATIC HYDROCARBONS DURING RADIATION OXIDATION IN AQUEOUS SOLUTIONS

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 17, No 12, Dec 81 (manuscript received 24 Sep 80) pp 2547-2552

VYSOTSKAYA, N. A., BORTUN, L. N. and REKASHEVA, A. F., Institute of Physical Chemistry imeni L. V. Pisarzhevskiy, Kiev

[Abstract] Results have been reported of a study of the reactivity of condensed aromatic hydrocarbons under conditions of stationary γ-radiolysis in aqueous solutions relating it to the number of aromatic rings in the system. Following compounds were studied: naphthalene, phenanthrene, chrysene and 3,4-benz-pyrene; the effect of substituents was evaluated on β-substituted naphthalenes. It was shown that electron donor substituents accelerated the reaction while electron acceptors tended to retard it. A two orders of magnitude difference was noted between the reactivity of CH_3- and -COOH substituted compounds. The reaction rate constants increased with the number of aromatic rings in the system. It was shown that there is good correlation between the relative reaction rate constants K_{rel} and σ^+-Hammett constants. It was concluded that the reactivity is related to electronic characteristics and the structure of the transition complex because of the fact that the rate-determining step occurred after the stage of the single electron transfer. Figures 2; references 16: 8 Russian (2 by Western authors), 8 Western.
[133-7813]

UDC 546.296:546.04

CURRENT STATE OF RADON CHEMISTRY

Moscow USPEKHI KHIMII in Russian Vol 51, No 1, Jan 82 pp 23-39

AVRORIN, V. V., KRASIKOVA, R. N., NEFEDOV, V. D. and TOROPOVA, M. A.,
Leningrad State University

[Abstract] This article summarizes the data available prior to May 1980 on the physical, chemical and radioactive properties of radon. Tables include a list of the known isotopes together with the half-lives, types of emitted radiation and daughter products and a list of the inert gases Rn, Xe, Kr, Ar and Ne together with the hydrate stability, ionization potential, ionic character of bonding, dissociation energy, electronegativity and others. Experimental difficulties of working with radon, such as its short half-life and its fugitive nature, are mentioned. The compound RnF_2 can be prepared from several different fluorinating reagents such as ClF_3, KrF_3, BrF_3, K_2NiF_6 in HF and others. Until now it has not been possible to prepare organic compounds of inert gases using classical techniques. Noble gas compounds may also be prepared via radiochemical techniques. Some applications of radon compounds, such as in decontamination of reactor and mine effluents, are discussed. References 121: 45 Russian, 76 Western. [127-12027]

RUBBER AND ELASTOMERS

UDC 678.01.543.42

INFRA-RED SPECTRAL STUDY OF GRAFT COPOLYMERS BASED ON ACRYLONITRILE AND ETHYLENE-PROPYLENE RUBBER

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, 1981
(signed to press 15 Dec 81) pp 87-90

BUNIYAT-ZADE, A. A., KAKHRAMANOV, N. T., ANNAGIYEV, M. Kh.,
DOROZHKINA, R. I., KAKHRAMANOVA, Kh. T. and SHCHARINSKIY, Ye. A.,
All-Union Scientific Research Institute of Olefins; Institute of
Inorganic and Physical Chemistry, AzSSR Academy of Sciences

[Abstract] The authors' previously described infra-red spectroscopic method for determining quantities of bound acrylonitrile in polyethylene, polypropylene and polybutene is here adapted to analyze the triple copolymer ethylene-propylene rubber and ethylidennorbornene. Prior to spectral analysis, the grafted copolymers were cleaned with dimethylformamide to remove traces of polyacrylonitrile. Then measurements were made of optical density at analytical absorption bands of 2246 and 4310 cm^{-1}. The procedures permitted construction of a calibrated graph of the function $C = \underline{f}\ (D)$, and formulas were derived for quantitative assay of grafted components in weight and molecular units. References 4 (Russian).
[97-12131]

UDC 541.64 : 539.3

FEATURES OF DEFORMATION-RESISTANCE OF BUTADIENE-STYRENE BLOCK COPOLYMERS DURING UNIAXIAL STRETCHING

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 1, Jan 82
(manuscript received 26 Aug 80) pp 77-83

VINOGRADOV, G. V., KURBANALIYEV, M. K., DREVAL', V. Ye. and
BORISENKOVA, Ye. K., Institute of Petrochemical Synthesis
imeni A. V. Topchiyev, USSR Academy of Sciences; Tajik State University
imeni V. I. Lenin

[Abstract] Thermoelastoplasts were studied under various uniaxial deformation conditions in broad speed and tension ranges in relation to temperature

and the manner of material forming at temperatures below glass point. The tested material was Shell's "Cariflex TR-1102," a butadiene-styrene block copolymer. It was extruded or molded from solutions containing toluene, cyclohexane or dioxane. The nature of tension from deformation was related to speed of deformation and temperature. Results showed that below the glass point, the block polymer underwent irreversible flow deformation, depending on the degree of deformation and the temperature. Viscosity declined under extreme tension. An important feature of vulcanized elastomers was the fracture envelope, which determined the strain and tension fracture point. On the one hand the copolymer behaved like a vulcanized elastomer in a wide range of temperatures and deformations, although at times it behaved as a single-phase elastomer. Yet under certain conditions the butadiene-styrene block copolymer showed features typical of structured multi-phase systems. Figures 5; references 23: 10 Russian, 13 Western (several by authors).
[104-12131]

UDC 678.063.01; 539.43.001.5

EFFECT OF FILLER LEVEL AND POLYMER TYPE ON FATIGUE RESISTANCE OF RUBBERS

Moscow KAUCHUK I REZINA in Russian No 1, Jan 82
(manuscript received 25 Mar 81) pp 16-19

KHROMOV, M. K., Scientific Research Institute of the Tire Industry

[Abstract] Assuming that the model for rubber fatigue resistance was subjected to conditions where the material's structure did not regenerate, calculations were made to determine optimal filler levels and polymer type under deformation and the development of dispersed defects. Where the material endures strain in a non-linear curve, only deformation energy need be considered as a feature of the strained state of the body and its reaction to outside forces. Chemically unstable elastomers were found to fail in relation to the activity of oxygen in the inter-phase adsorption layer. Oxygen quantities decreased with temperature increases and decreases in partial oxygen pressure in the environment. The coefficient of rubber fatigue was calculated in relation to various fillers for butadiene-styrene, natural and "stereo-regular" isoprene rubbers. It was concluded that the degree of damage of composite materials depends on the proportions of various rubber types in the mixture. A formula was developed to reflect fatigue resistance of various rubbers when subjected to mechanical forces of varying intensity, with heat as an additional important factor. Figures 2; references 7 (Russian).
[125-12131]

UDC 678.043.93

REACTION OF EPOXY RESINS WITH NON-POLAR RUBBERS

Moscow KAUCHUK I REZINA in Russian No 1, Jan 82
(manuscript received 7 May 81) pp 20-23

ONISHCHENKO, Z. V., ZORINA, V. B., ZAMKOVAYA, V. V. and KUTYANINA, V. S.,
Dnepropetrovsk Chemical Technological Institute imeni F. E. Dzerzhinskiy

[Abstract] Special purpose rubbers such as chloroprenes, methylvinylpyridines and carboxylates were studied by infra-red spectroscopy and potentiometric titration to determine changes in epoxy group content in rubber-resin compositions. Since production rubbers contain stablilizers, they were removed by acetone extraction followed by triple precipitation of benzene solutions with ethanol. The type of mixing equipment used in production was found to determine the intensity of epoxy group disbursement; rolling caused more intensive mechanical activation and led to the formation of more polymer radicals than occurred with mixing processes. Injection of epoxy resins during mixing appeared to bring breakdown of the rubber during this operation. Increased length and heating temperature, followed by longer curing, contributed to better bonds of the epoxy resin to rubbers. Better durability and fatigue resistance also followed these changes in processing. Figures 4; references 11 (Russian).
[125-12131]

UDC 678.84.063.019.391 : 678.046

EFFECT OF AEROSIL CONTENT ON RUBBERS BASED ON SILOXANE DURING OPEN AIR CURING

Moscow KAUCHUK I REZINA in Russian No 1, Jan 82
(manuscript received 14 Oct 80) pp 23-26

GOLDOVSKIY, Ye. A., CHUBAROVA, G. V. and DONTSOV, A. A., Scientific
Research Institute of the Rubber Industry

[Abstract] Vulcanized dicumylperoxide rubbers based on dimethylmethylvinylsiloxane with a redoxide heat stabilizer and much more age-resistant dimethyldiphenylmethyl vinylsiloxane with an iron oxide stabilizer were studied in terms of various degrees of filling, aging temperatures and rubber types. A period of rapid destructive changes and a slower process of relative stretching were identified, and the remaining findings were divided into these sub-categories. Increased amounts of silica powder reduced cross-linking during rapid aging in the first rubber, with increased sol fractions. During relatively slow aging this relation was reversed. Thus, aerosil reduces oxidation during rapid aging, while during slower aging its effect is tied to destructive processes in the vulcanizer matrix and cross-linking of polymer chains. Stretch was found to increase during

slower aging as aerosil levels were increased, while stretch decreased during rapid aging. These experimental results were related to practical applications where aging time is figured in hours or days at minimum. At temperatures higher than 300° C, it is necessary to employ heat stabilizers that will permit reduction of aerosil filler quantities. Figures 5; references 3 (Russian).
[125-12131]

UDC 678.84.063.01 : 541.6 : 678.048

HEAT STABILIZATION OF RUBBERS BASED ON SILOXANES USING AEGIRITE CONCENTRATE

Moscow KAUCHUK I REZINA in Russian No 1, Jan 82
(manuscript received 25 Jun 81) pp 26-28

KISEL', L. O., DAROVSKIKH, G. T., KRASOVSKIY, V. N. and MANAYEVA, G. I., Leningrad Technical Institute imeni Lensovet

[Abstract] Assuming that aegirite concentrate contains as much as 23% iron oxide ($Fe_2O_3 \cdot FeO$), the redoxide equivalent of aegirite concentrate would be 20 parts by mass. Rubbers with this content and with 5 parts by mass of redoxide were studied to determine mass loss at 20° C and during heating at 300° C for 72 hours. With both redoxide and aegirite, no significant changes in structure were observed, but the latter provided a thicker structure and thus there was a lesser accumulation of residual deformation. A stability-in-storage test after holding the samples at 40° C for 2.5 months showed equal durability. Thus, use of aegirite offers considerable savings, since it is a byproduct of rare metal ore enrichment. Figures 3; references 6 (Russian).
[125-12131]

UDC 66.069.84 678.7

BUBBLING POLYMER EXTRACTOR FOR EXTRACTING SYNTHETIC RUBBERS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 81 pp 10-12

DOMANSKIY, O. V., candidate of technical sciences, GOL'TSOV, I. N., KLOTSUNG, V. A. and MART'YANOV, E. V., engineers, and TUROVSKIY, A. P., candidate of technical sciences

[Abstract] A complex processor was designed, consisting of a steam disperser, a bubbling polymer extractor and a cyclone-type centrifugal extractor. Polymer, solution, circulating hot water and live steam are injected to form pellets, which then are converted into a gaseous liquid mixture before emerging as a synthetic rubber pulp. Current industrial

applications of 4 ton/hour capacity are used in conjunction with other degasification processes. Effectiveness of this process was compared to a volume method involving a mixing device. The bubbling extractor showed 1.6% of mass containing organic compounds, while the volume method showed 2.1% of such impurities. The apparatus has functioned without down time since its industrial application. Mass production will begin at the Penza Chemical Machinery Plant. Figures 2; references 3 (Russian).
[96-12131]

UDC 66.095.2 678.746.222

HIGH TONNAGE POLYMERIZATION EQUIPMENT FOR PRODUCING IMPACT-RESISTANT POLYSTYRENE

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 81 pp 16-18

MEDVEDEV, V. D. and POLYAKOV, V. N., engineers, KONSETOV, V. V., candidate of technical sciences, DRANKOVSKIY, I. K., MEL'NIKOV, V. V., FENIN, Yu. I. and KOBLYANSKIY, V. A., engineers

[Abstract] The system includes a small-capacity rotor-pulsation mixer, into which synthetic rubber, styrene and various additives are injected. The mix then goes to a heated pre-polymerizer and a polymerizer. Finally, it is heated in a vacuum chamber to 220° C, from which it is extracted for later processing. Monomer distillation is used to extract excess heat from polymerization; the monomer is then cooled and re-used. The process increases the mix viscosity to $4 \cdot 10^2 - 6 \cdot 10^2$ Pa-s (expansion unknown). It requires special solutions related to such factors as the thickness of the walls of the vessels used, possible agglomeration of the environment, and the need to dissolve rubber particles in styrene. Comparative analysis prior to design indicated a tube-type heat exchange jacket should be used. Extraction from the vacuum chamber is accomplished by a gear unloading device. The system is now in industrial use. Figures 3; references 7 (Russian).
[96-12131]

UDC 648.4.601.4 : 547.54.39

MODIFYING BUTADIENE-STYRENE RUBBER WITH EPOXY RESINS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 24, No 12, Dec 81
(manuscript received 26 Feb 80) pp 1558-1562

ZORINA, V. B., ONISHCHENKO, Z. V., KUTYANINA, V. S. and
ZAMKOVAYA, V. V., Department of Resin Technology, Dnepropetrosvk Chemical Technological Institute imeni F. Ye. Dzerzhinskiy

[Abstract] Infra-red spectroscopy was used to determine the modification of butadiene-styrene rubber by epoxy resins. Oxygen was a key to the interaction of the compounds, which involved both hydrogen atoms of the rubber methyl group and oxidized groups of the elastomer. Additives such as emulsifiers and stabilizers in the rubber affected changes in the new mixture. Heating of technical rubber containing rosin and neozone D in the presence of epoxy resin was not accompanied by gelatination, indicating the possibility of eliminating rosin and stearic acid from such rubber formulas. Epoxies should be added at the granulation stage or during first mixing, while vulcanization accelerators should be added later to avoid deactivating the epoxy resins. Figures 3; references 5 (Russian).
[122-12131]

WATER TREATMENT

UDC 630*866/.867: 628.356 + 628.356.3

COMPARATIVE ANALYSIS OF PURITY OF WASTE WATERS FROM WOOD PULP PLANTS AFTER PURIFICATION WITH EITHER AERATION OR BIOFILTRATION

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, 1982 (signed to press 18 Jan 82) pp 5-8

KUDRYAVTSEV, G. S., senior scientific associate, ANFIMOV, P. Ye., junior scientific associate, KARELIN, Ya. A., doctor of technical sciences, and ZHUKOV, D. D., candidate of technical sciences

[Abstract] The title study was carried out at four plants (Syava, Asha, Moloma, and Dmitriyevskiy) using aeration and five plants (Zima, Medvezh'yegorsk, Lesosibirsk, Reshotinskiy and Dmitriyevskiy) using both biofilters and aeration. Overall, aeration is more effective than biofiltration. For example, the biochemical oxygen demand of water purified by the former is 6.3 to 30 mg/1, but by the latter, 40 to 220 mg/1; the degree of purification is 95.2 to 99.3% for the former and 40.0 to 87.9% for the latter. A number of other parameters are also listed. Capital expenditures per cubic meter of processed water is 140 to 400 rubles for aeration and 400 to 800 rubles for biofilters. The lower efficiencies of the latter can be explained by the short time that the solution is in contact with the biofilter, the less favorable conditions for microbe growth, and the semi-continuous nature of the process. Figures 4; references 9: 8 Russian, 1 Western.
[130-12027]

CSO: 1841

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